PACKAGE engineering

Test food packages without using food

Exploring the stability and interaction of irradiated foods and packages, a team of researchers used "model" foods (chemical solutions controlled to simulate actual foods) for testing with various films, laminations. (See Page 43)

Product demand controls packaging lines

The first thorough-going account of the development and function of one of our nation's most highly automated batteries of packaging lines stresses intricacies of letting demand at cartoners govern all preceding operations. (See Page 46)

How to improve thermoformed packaging

Combining package versatility, machine modification, and work method development (some as simple as folding a package while still hot) to get speeded-up skin packaging for costly items needing long shelf life. (See Page 64)

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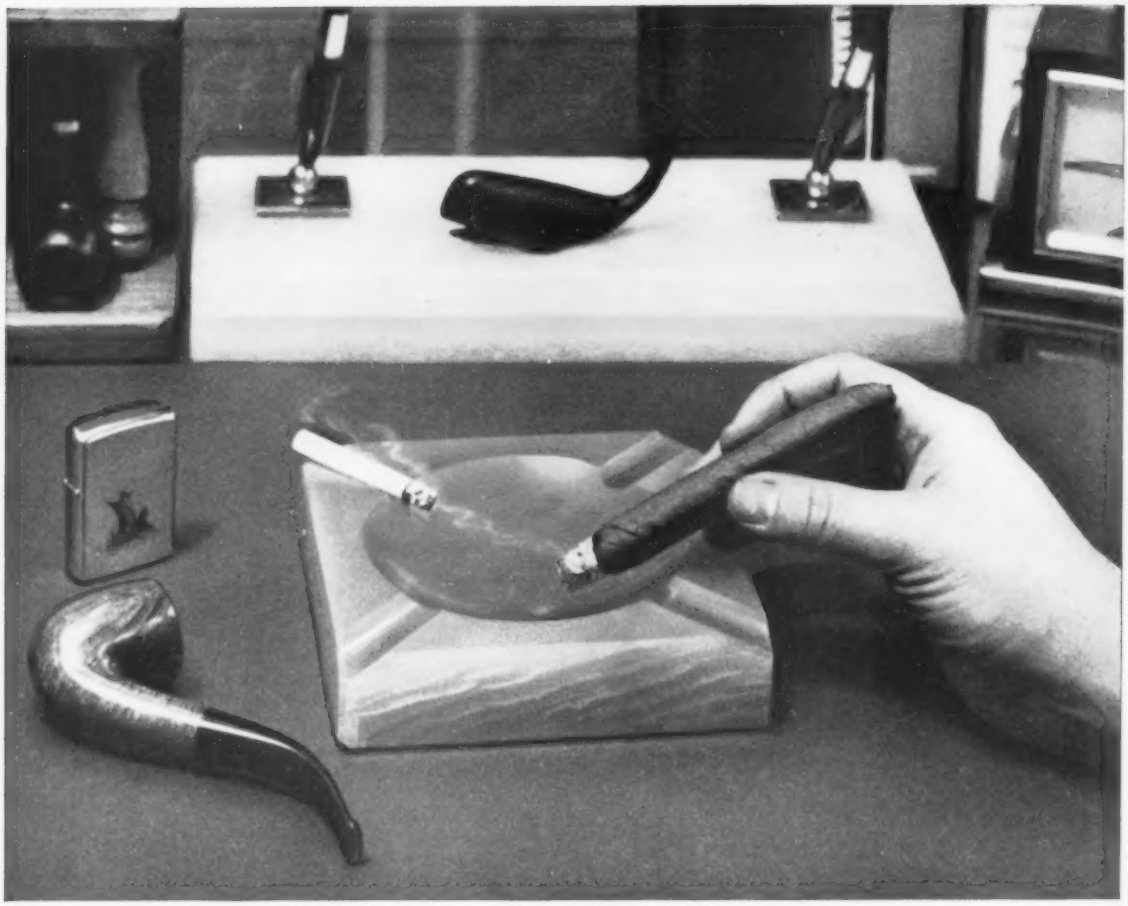
APRIL 1960

VOLUME 5 • NUMBER 4

Serving the tobacco industry world-wide



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For more information circle No. 201 on Reader Service Card, Page 117

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For your calendar

April 4-6. AMA National Packaging Conference, Shelburne Hotel, Atlantic Citv, N.J. Contact: John L. Wood, packaging coordinator, American Management Association, 1515 Broadway, New York 36, N.Y. *Telephone: JUdson 6-8100.*

April 4-7. AMA 29th National Packaging Exposition, Convention Hall, Atlantic City, N.J. Contact: John L. Wood, packaging coordinator, American Management Association, 1515 Broadway, New York 36, N.Y. *Telephone: JUdson 6-8100.*

April 12. Packaging Institute professional member seminar on glass container technology, Statler-Hilton Hotel, New York, N.Y. Contact: Charles A. Feld, executive director, Packaging Institute, 342 Madison Avenue, New York 17, N.Y. *Telephone: MUrray Hill 7-8875.*

April 19-21. Research and Development Associates, Food and Container Institute, Inc. annual meeting, Congress Hotel, Chicago, Ill. Contact: Col. R. A. Isker, secretary, Research and Development Associates, 1819 W. Pershing Road, Chicago 9, Ill. *Telephone: Lafayette 3-5500.*

April 19-23. Interpack and EPF Congress in Duesseldorf, Germany. Contact: Pierre J. Louis, Institut Francais de L'emballage et du Conditionnement, 3 Rue La Boetie, Paris 8, France. *Telephone: ANjou 68-48-72-56.*

May 15-19. Institute of Food Technologists, 20th Annual Meeting, Fairmont Hotel and Masonic Temple, San Francisco, Calif. Contact: Col. Charles S. Lawrence, executive secretary, Institute of Food Technologists, 176 West Adams, Chicago. *Telephone: ANdover 3-6268.*

June 1. Packaging Institute professional member seminar on aerosol packaging, Statler-Hilton Hotel, New York, N.Y. Contact: Charles A. Feld, executive director, Packaging Institute, 342 Madison Avenue, New York 17, N.Y. *Telephone: MUrray Hill 7-8875.*

June 12-25. Industrial Managemnt Center's 7th Annual Materials Handling and Packaging Training Course, Lake Placid Club, New York. Contact: James R. Bright, director, Industrial Management Center, 56 Robbins Road, Lexington, Mass.

July 19-21. Western Packaging and Materials Handling Exposition, Pan Pacific Auditorium, Los Angeles. Contact: Clapp and Poliak, Inc., 759 Monadnock Building, San Francisco 5, Calif. *Telephone: DOuglas 2-7876.*

October 31-November 2. Packaging Institute 22nd Annual National Packaging Forum, Statler-Hilton Hotel, New York, N.Y. Contact: Charles A. Feld, executive director, Packaging Institute, 342 Madison Avenue, New York 17, N.Y. *Telephone: MUrray Hill 7-8875.*

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PACKAGE engineering

AN ANGUS J. RAY PUBLICATION

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55 The coming revolution in aerosol filling, by Robert Neal Black, engineering consultant
Analyzing the current techniques and equipment in aerosol filling, and suggesting what should be done to have maximum aerosol packaging efficiency.

64 High-speed skin packaging for long shelf life, by Roy W. Hill, superintendent of maintenance, traffic and stores, Besly-Welles Corporation
Packaging costly machine tools, utilizing good, yet economical, structural package design resulting from systematic solutions to problems.

74 Anticipating problems of collapsible tubes, by Mark K. Dresden, packaging and management consultant
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92 A practical filing system for packaging information, by Francis J. Sloan, package developer
Describing a filing system — including subject headings — whereby the packaging engineer can find needed packaging information quickly and efficiently.

90 Inclined case sealer does two jobs, by Charles R. DeSpain, vice president and general manager, Heaven Hill Distilleries, Inc.
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96 Practical pointers to better folding carton performance: Part III—Pre-breaking scores and other manufacturing details
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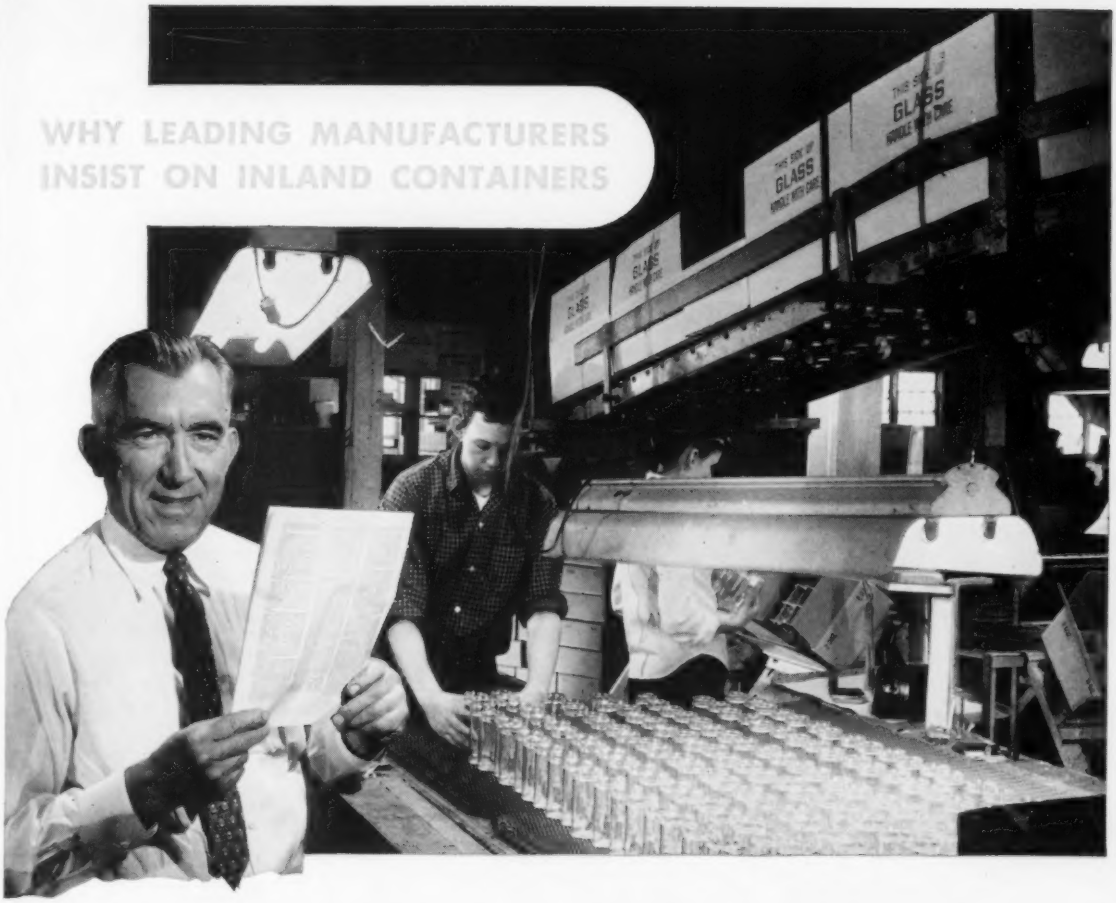
WHY LEADING MANUFACTURERS
INSIST ON INLAND CONTAINERS



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A note from the Publisher

Packaging Abstracts

There are approximately 2,000 business magazines published in the United States. About a dozen of these are devoted to a particular aspect of packaging and probably 200 carry some editorial material on packaging ranging from an occasional article to a consistent, every-issue program. In addition, there are many magazines published in a dozen different countries outside the United States that carry varying amounts of editorial material on packaging.

Obviously you can't read them all, yet in a year's time many of these magazines will have information of special interest to you. You may want general information about a particular interest in packaging, or you may want as many viewpoints as possible on a special project.

Many research libraries, package development laboratories, engineering departments, and individuals throughout the world supplement their regular reading with *Packaging Abstracts*, published by the British Research Association, PATRA—The Printing, Packaging & Allied Trades Research Association. *Packaging Abstracts* is published monthly and each issue carries an average of about 420 abstracts based on literature in the PATRA library that is received from all over the world. To give you some idea of its scope, the information contained in it is based on approximately 200 magazines containing packaging articles, over 150 devoted to printing and allied subjects, in addition to numerous patents, books, pamphlets, and technical data supplied by manufacturers of packages, materials, and machinery.

No matter what your business—be it supplying or using packages or packaging materials, supplying or using machinery—there will always be several items in each issue of *Packaging Abstracts* of interest to you.

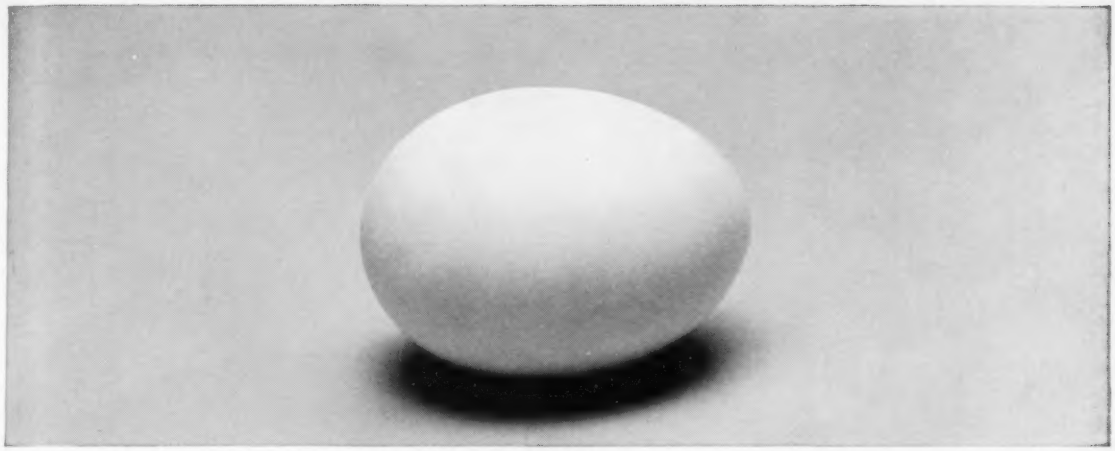
This is a publication that would prove of value to every company operating a package research and development laboratory, or an engineering department concerned with packaging. Every supplier of packages, packaging materials, and machinery would find it invaluable in keeping posted on developments that are taking place in practically every country in the world. *Packaging Abstracts* covers only scientific and technical matters and does not attempt to enter the field of surface design or the use of the package as a sales tool.

While the publication is widely circulated outside the United States, it has at this time a somewhat limited circulation in the United States, but I think many of our readers would find *Packaging Abstracts* a valuable addition to their library.

Therefore, we are pleased to have been selected by PATRA to be its exclusive sales agent and distributor in the United States.

Angus J. Ray

Publisher



Even nature's most perfect package

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Recent scientific tests at a state university laboratory have proved that eggs in cellophane wrapped cartons stay fresh *seven times longer* than eggs in unwrapped cartons. Even more, a major egg company is now using this new packaging concept with tremendous success. Here's why: (1) Cellophane provides the moisture and oxygen control eggs require. (2) Foreign odors can't permeate cellophane to spoil the taste of eggs. (3) Cellophane carton overwraps keep eggs clean and prevent tampering. (4) Broken eggs won't leak through the film. (5) These advantages give egg packers and retailers a fine promotional tool to increase sales and profits.

Cellophane offers similar benefits in the packaging of *any* product where freshness and flavor retention are essential—plus the sales appeal of pure transparency and unmatched packaging machine performance. We offer a complete packaging service to assist you and demonstrate how Avisco cellophane, plain or printed, will answer *your* requirements better and more economically than any other packaging material. Contact us for an appointment with our representative in your area or a selected cellophane converter specializing in your field.

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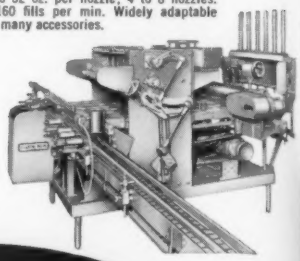
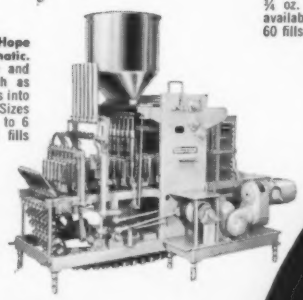
No. 19A Colton-Hope High-Speed Automatic. Fills liquids, creams, pastes into bottles, jars, cans. ⅛ oz. to 32 oz. per nozzle; 4 to 14 nozzles. Up to 250 fills per min. Many accessories available.

No. 19 Colton-Hope High-Speed Automatic. Fills liquids, creams, pastes into bottles, cans, jars. Excellent for filling, top-finishing, disc-placing in cosmetic cream work. ¾ oz. to 32 oz. per nozzle; 4 to 8 nozzles. Up to 160 fills per min. Widely adaptable through many accessories.



No. 15RF2 Colton-Hope Two-Line High-Speed Automatic. Fills liquids, creams, pastes into glass, plastic, tin, paper containers. ¾ oz. to 32 oz. per nozzle; 1 or 2 nozzles available. Many outstanding features. Up to 60 fills per min. Many accessories available.

No. 27 Colton-Hope Heavy-Duty Automatic. Fills high viscosity and ropy materials such as caulking and greases into tubes or cartridges. Sizes up to 2" x 10"; 2 to 6 nozzles. Up to 90 fills per min.



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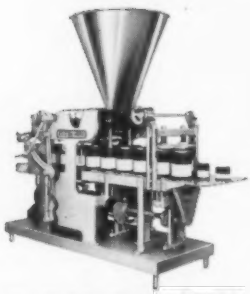
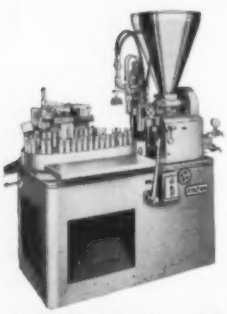
These basic fillers typify the wide range of filling covered by the Colton line—most complete and versatile in the world. Such basic machines, readily adaptable to individual application by means of accessories engineered to the machine, give, in effect, a custom-engineered machine at standard machine price. It is this adaptability that enables us to say "Colton fills practically ANYTHING into ANYTHING." Many other Colton fillers available. Write for Filling Machine Application Data Sheet. Detailed specification sheets available. Arthur Colton Company, 3400 E. Lafayette Ave., Detroit 7, Michigan. Sales and Service offices throughout the country. Plants: Detroit, Mancelona, Elk Rapids, Michigan.

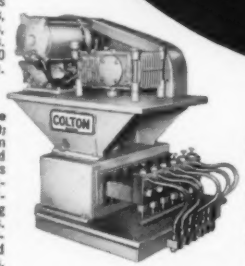


No. 21 Colton-Hope Single and Twin Automatic Conveyorized Heavy-Duty Filling Machine. For filling liquids, creams, light and heavy pastes such as paints and similar products into jars and cans. Production up to 10 cycles per minute per nozzle. Fills up to 1 gallon per nozzle. 1 and 2 nozzles available. Paint can lid dropping and pressing features available.



No. 175 Colton Automatic Tube Filler, Closer and Crimper with Ejector.* Fills liquids, creams, pastes into tubes, small bottles, jars, cans. Cleans, fills, folds, crimps, ejects. Various fillers offer 30 to 300 tubes per min. per machine.

***No. 176 Plastic Tube Sealing Attachment;** low cost conversion unit to replace standard folding heads on Models 17TF and 175TF machines. Gives dual-purpose machine handling metal or plastic tubes. Model 172 Colton exclusively for high speed sealing of plastic tubes.



Series 100 Colton High-Speed Multiple Liquid Fillers, (for bench or conveyor belt use). Fills liquids into jars, bottles, cans. Up to 4 fl. oz. per nozzle; 4 to 12 nozzles. Up to 480 fills per min. Can be manifolded for larger fills. Extreme accuracy, high production in a low-cost machine.

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COME IN, THE ICE IS FINE. But what if your package can't take it? The question of temperature and humidity extremes is but one of many considered by CCA packaging engineers **before** they design the most efficient package for a specific job. Your product may never require direct icing, but the package for your product will reflect **this kind of advance planning.** To **pack it—move it—sell it** is the business of CCA packaging.

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The PULSE / of packaging

Trends to watch:

Whether you call it a "trend" or widespread condition, a problem that continues to plague packaging line production heads from coast to coast is the difficulty of getting machinery adjusters and packaging line mechanics. Some companies now report increasing use of aptitude tests to screen out the obviously unfit, others are laying out elemental, "homemade" training courses on the job. . . . Some overwrap converters and carton sources now privately admit seeing a long-range trend in cartons to the all-plastic package and are guiding their research in that direction. Some of them are speculating on the greater use of nylon and improved polystyrene. . . . Metal can shipments during 1959 hit an all-time peak, exceeding 1956 (previous top year) by three per cent, with cans for soft drinks in the lead, says **Can Manufacturers Institute.** . . . Proponents of molded pulp containers say cross-country tests of apple shipments showed 89 per cent of the test apples came through "sound," ten per cent were bruised, and none with skin breaks. . . . Shipment of collapsible metal tubes set an all-time record during 1959, running 14 per cent above 1958's total, **Collapsible Metal Tube Manufacturers Council** reports. . . . Suppliers of packaging for frozen foods says there is going to be "a big boom" in dehydrated products, add that latest techniques give freezing without crystals. They say many foods are "potentials" and even more so once packagers solve such problems as the handling of volatile oils with dehydrofreezing. . . . Another all-time high: Glass container shipments for 1959 ran 6.5 per cent above those of 1958, according to **Glass Container Manufacturers Institute.**

Packaging across the seas:

French Packaging Institute plans the First International Machinery Show "Autopac" to be held in Paris October 14-23. . . . **Vaessen-Schoemaker Co.** of Holland has granted **Spencer Chemical Co.** exclusive rights to its fabricating process by which to make large containers and similar items from powdered polyethylene. . . . **The Dow Chemical Co.** has formed a new company, **Dow Chimica Italiana S. P. A.,** which will build a multi-million dollar manufacturing plant in Italy. . . . **Arenco AB** of Stockholm has purchased **Kisab AB,** Gothenberg, Sweden, producer of high-speed forming, filling, and sealing machinery.

Groups in the news:

American Institute of Electrical Engineers has formed a Packaging Industry Subcommittee to explore electrical problems in the packaging field and to promote recommended practices and standards. . . . **Packaging Institute** is now calling for nominations for the 1960 corporate and professional awards. Deadline: May 15. Details and entry forms available from PI's office.

Notes from the government:

U. S. Forest Products Laboratory, Madison, Wis., is observing its golden anniversary with a three-day celebration June 2-4 at Madison, will show off its facilities, review research goals, and examine trends of the future.

More expansion for packaging:

Extrudo-Film Corp. has acquired **Alfred Charles & Co.,** Milford, Conn., extruder of cast polyethylene and polypropylene. . . . **Stone Container Corp.** plans to move its executive and general offices to downtown Chicago. . . . Construction has begun on a new $75,000, 7,000-sq.-ft. addition to the **H. B. Fuller Co.** plant, Linden, N. J. . . . **Boston Plastic Machinery Inc.** has been purchased and made the blow molding division of **Modern Plastic Machinery Corp.**

A new research and development center to be located in the St. Paul area is planned by **Wood Conversion Co.** . . . **Polyethylene Corp. of America,** as a new film extruder, recently started operations at Cranbury, N. J., specializing in polyethylene sheeting. . . . **Riegel Paper Corp.** has acquired **Bartelt Engineering Co.,** Rockford, Ill., packaging machinery manufacturer. . . . **Wheaton Companies** announce formation of a new company, **Wheaton Plasti-cote Corp.,** with offices in Millville, N. J. and factory in Mays Landing, N. J., to manufacture and sell plastic coated glass containers for aerosol products.

Milprint, Inc. has announced completion of a $100,000 project adding 9,500 sq. ft. to its Milwaukee plant. . . . **Emhart Manufacturing Co.'s** Portland Div. has purchased the line of automatic taping machines manufactured by the Machinery Div. of **Wagner Iron Works,** Milwaukee. . . . **Ball Brothers Co. Inc.** has purchased **Atlantic Zinc Works, Inc.** and its subsidiary **Rolled Plate Metal Co.** . . . Consolidation of design and manufacturing facilities under one roof has been announced by **Bell-Mark Corp.,** Newark, N. J. . . . A new polyethylene film plant of **The Dow Chemical Co.** is nearing completion at Fresno, Calif. . . . **Brown-Superior Paper Goods Co.** has announced its merge with **American Envelope Co.**

Sherman Paper Products Co., Newton, Mass., is now affiliated with **St. Regis Paper Co.** through an exchange of stock. . . . **Continental Can Co.** is setting up plastic bottle production facilities in Los Angeles, Baltimore and Cincinnati, to supplement the production offered by its present Chicago plant. . . . **Chippewa Plastics Co.** has begun production of polypropylene film. . . . A new corporation, **Presto Adhesive Paper Co., Inc.,** has been formed to manufacture pressure-sensitive adhesive paper stocks for the graphic arts field. . . . **Reynolds Metals Co.** is planning construction of a $700,000, and 20,000-sq.-ft. pilot plant for development of new types of aluminum containers.

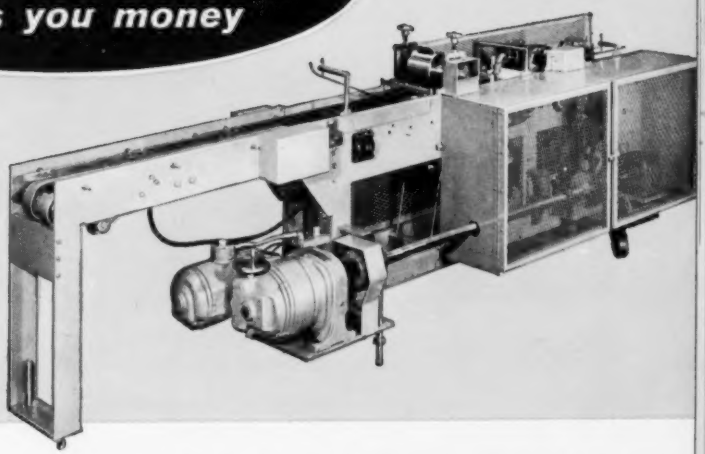
Packaging Corp. of America has established its corporate headquarters in Evanston, Ill. . . . **Hoerner Boxes, Inc.** announces completion of its new sheet plant at Springfield, Mo. . . . Production facilities for converting polyethylene film to bags at **Chase Bag Co.'s** New Orleans plant has been announced. . . . **G. Barr and Co.** has expanded manufacturing and warehousing space by 15 per cent. . . . **Plastic Papers Inc.** is now in full production, polyethylene coating paper and paperboard at its new 31,000-sq.-ft. plant at Hicksville, N. Y. . . . **Vulcan Containers, Inc., Vulcan Steel Container Co., Southwestern Steel Container Co., Vulcan Containers Ltd., Vulcan Containers (Canada) Ltd., Vulcan Containers Pacific, Inc., and Atlantic-Vulcan Steel Containers, Inc.** have consolidated to form **Vulcan-Associated Container**

Waldorf KNOWS *Packaging* AUTOMATION

Waldorf designed this packaging line in cooperation with a major appliance manufacturer. Now 2 men and this machine do the work which formerly required 6 to 8 men. This operation automatically sets up, top seals, loads and bottom seals a regular style container. Waldorf also designed a package using less material, further increasing this manufacturer's saving.

Waldorf packaging experience saves you money

The Waldorf frozen food package closer is one of several machines designed by Waldorf to speed frozen food packaging. It automatically closes and locks over 10,000 cartons per hour. Travel of the carton through the machine is completely automatic. This Waldorf closer may be used with the Waldorf former, Waldorf interleafer or both for full automation.



Few companies, if any, can match Waldorf when it comes to machine designing and machine building. Waldorf pioneered customer plant labor-saving, package handling equipment nearly 20 years ago . . . this experience has enabled us to solve many of the complex problems of automated packaging.

If you are an executive looking for money-saving, labor-saving ways to package your products, write Waldorf today or telephone MIdway 6-7321.

WALDORF **PAPER PRODUCTS COMPANY** ST. PAUL 14, MINN.

This new method of skin packaging, utilizing Monsanto Polyethylene as a coating permits the film to be sealed to an uncoated-unperforated paperboard base. It allows full visibility of product and printed message on the base, protects against pilferage, keeps out dust, dirt, and moisture. Skin packaging method (both film and machinery) used to package Atlas Precision Products Co. gears, developed by Print-A-Tube Co., Paterson, N. J.

MONSANTO

Polyethylene

MOISTURE RESISTANCE & SEALABILITY

save your packing dollars here

SKIN PACKAGING, the highly versatile, new low-cost packaging development, gets its resistance to moisture vapor, and long lasting sealability to uncoated-unperforated board base, from film based on Monsanto Polyethylene resins.

Monsanto Polyethylene resins were specifically developed for industrial packaging applications. Monsanto "Big Batch Uniformity" in production assures dependable packaging service—in skin packaging, and in bags and liners.

Write for complete information about packaging films based on **industrial-tough** Monsanto Polyethylene, to Monsanto Chemical Company, Plastics Division, Room 703, Springfield 2, Mass.

Monsanto

MONSANTO DEVELOPER IN **PLASTICS**

For more information circle No. 207 on Reader Service Card, Page 117

Stein-Platt MACHINERY CO. INC.
ROCHELLE PARK, N. J.

"Comparison has proved it!"

VERDICT

THE WORLD SUPER C.M. HAS NO EQUAL!

Prospective customers of glass labeling machinery are like prospective customers everywhere . . . they want to be sure they're right even *after* they buy. Recently several owners of the versatile Super C.M. labeler have been approached by competitive machinery manufacturers who offered to put in their equipment on a "trial" basis.

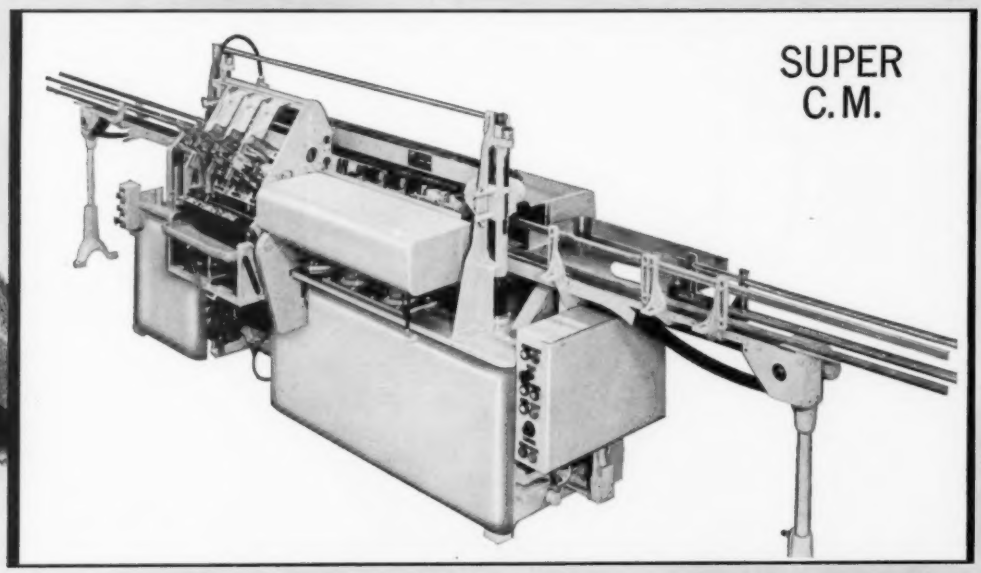
"Why not?" they agreed . . .

Result? . . . hands down proof that the WORLD Super C.M. is by far the most versatile high speed labeler ever used!

In test after test it outperformed each and every competitive machine. The Super C.M. was so superior in operating efficiency against any competitive machine, that there was no real basis for comparison. Proof . . . that performance is the only true measure of machine worth.

There is a substantial price differential between the Super C.M. and the competitive labeling equipment offered in these trials, but an operating efficiency of better than 10-15%, more than offsets this investment.

We will be glad to show you factual proof of Super C.M. performance. Better still . . . let us tell you what this unit can do for your packaging line.



Good Labeling *Sells!*

WORLD LABELERS

ECONOMIC MACHINERY COMPANY • WORCESTER 3, MASS. / Division of Geo. J. Meyer Manufacturing Company

World's Largest Manufacturer of High-Speed Labeling Machinery

This is only one proof of GAYLORD *quality*

Here you read the measurable qualities in Gaylord Containers.

But how do you measure experience and ingenuity . . . which are *extra* qualities built into every Gaylord box?

Gaylord is part of a completely-integrated, nation-wide organization of packaging talents, devoted to delivering the most efficient, most economical container you can buy.

Your nearby Gaylord Man can prove this. Why not let him try?

Seal illustrated above used for shipping containers conforming to Uniform Freight Classification No. 41.

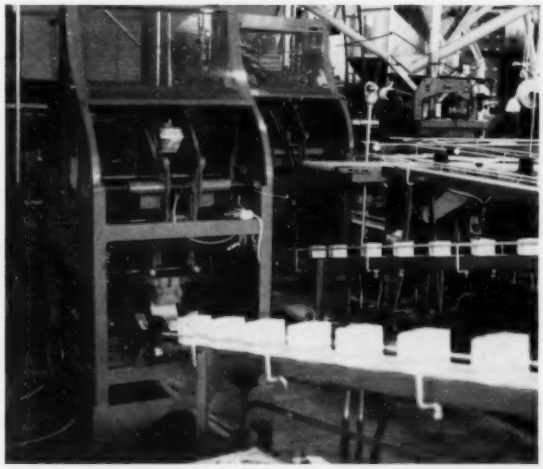
CROWN ZELLERBACH CORPORATION
GAYLORD CONTAINER DIVISION

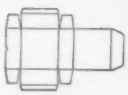
IN CANADA · CROWN ZELLERBACH CANADA, LTD. VANCOUVER, B. C.

HEADQUARTERS, ST. LOUIS
PLANTS COAST TO COAST

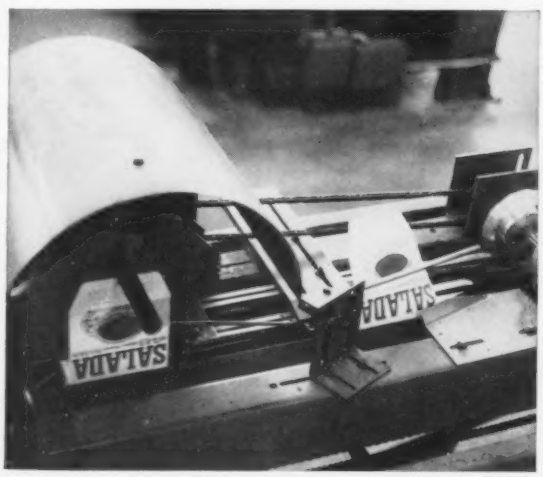
How Integrated PACKAGE Line Speeded Package Design Changeover at Salada

1. **NEW PACKAGE.** A change in package design and a move into what has been called the most modern and efficient tea blending and packaging operation in North America was the beginning of a cost reducing and tremendously successful packaging operation for Salada-Shirriff-Horsey in Woburn, Massachusetts. Utmost efficiency was obtained by using three PACKAGE machines in this modern approach to high-speed packaging.

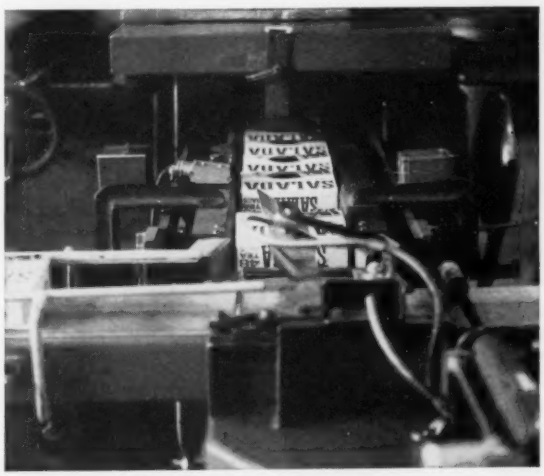


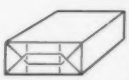


2. **CARTON FORMING.** Flat die-cut blanks, that take up 85% less storage space than the old, pre-formed cartons, are used with two Package PA continuous motion carton forming machines. Completely automatic, the PA sets up the new flip top carton at speeds of 80 to 100 a minute and then drops them on a conveyor belt to the packing line.



3. **CARTON CLOSING.** Filled with tea bags the open cartons are fed into a Package PC Carton Closer. The carton is then automatically closed and passed on to the next operation. As are all Package machines, the PC is easily adjusted to take all the carton sizes used by Salada. The closed carton then goes into a Package FA overwrapping machine.





4. **WRAPPING.** Here the boxes have been overwrapped in cellophane on the FA and are ready for market. No matter what type of packaging operation you have, your Package Sales Representative can show you how to do it better with an integrated line by Package Machinery . . . designed to work together for fast, efficient, automatic packaging.

PACKAGING IS PART OF YOUR PROFIT PICTURE

PACKAGE MACHINERY COMPANY, EAST LONGMEADOW, MASS.

NEW YORK • PHILADELPHIA • ATLANTA • BOSTON • CLEVELAND • CHICAGO • KANSAS CITY
DALLAS • DENVER • LOS ANGELES • SAN FRANCISCO • SEATTLE • TORONTO • MEXICO CITY

PACKAGE

"STIXIE" plans success

Stixie and Ralph Bates plan ahead.

Stixie and Ralph Bates spend their nights devising ways to turn out higher quality *pressure sensitive products* faster than anyone else. By day, they put these ideas to work.

Stixie is the dedicated little elf who symbolizes Coated Products' dependability, quality and service. Ralph Bates is Coated Products' Production Superintendent — a man who has 30 solid years of shop management behind him.

Stixie and Ralph are most sensitive about Coated Products' pressure sensitive products. They feel a deep responsibility to fill customer orders promptly and efficiently. They see to it that the right men work on the right job, that the proper ingredients are properly applied in each mixing, coating and converting operation (Coated Products does all its own mixing of adhesives and coating of release papers), and that each customer order is packaged perfectly and shipped on schedule.

When these two devoted souls are not planning, they're working . . . and vice versa. Why not drop in and watch Stixie and Ralph practice their productive legerdemain? It's a sight to warm the heart of any customer in a hurry for his order.

STIXIE 5

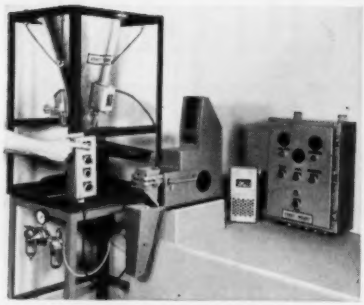
pressure sensitive products

COATED PRODUCTS, INC.

275 LINCOLN BOULEVARD • MIDDLESEX, NEW JERSEY • ELLIOT 6-3700

Exact Weight® Automatic Net Weighing Machines . . .

weigh and feed any dry, free-flowing materials

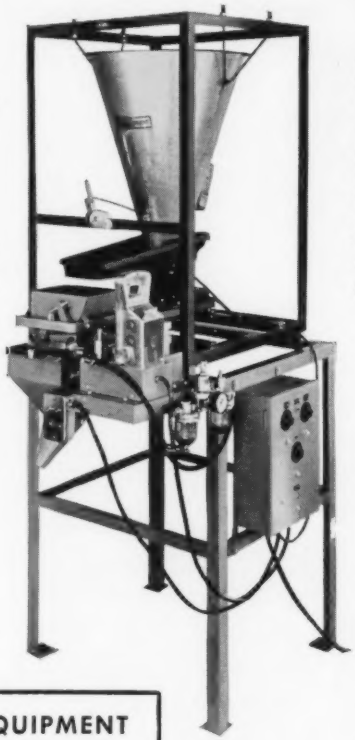


PRECISION AUTOMATIC

Model 4601NW, above, is designed for weighing dry products with accuracies of 1/10 gram on quantities below 10 grams and one percent accuracy on quantities of 10 grams and above. Combines a high-accuracy Shadograph Scale, air-operated dump mechanism, hoppers, vibratory feeders and photoelectric controls. Precision models with capacities from 50 grams to 500 grams. Write for Bulletin 3363.

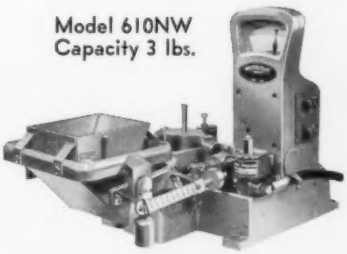
FOR PACKAGING, BAGGING, BATCHING, COMPOUNDING

Over-under indicator provides constant visual check on weighments



Model 620NW
Capacity 10 lbs.

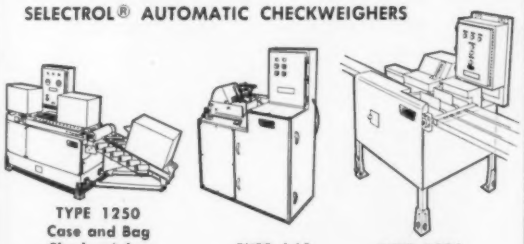
Model 610NW
Capacity 3 lbs.



Net Weigher can be supplied without the feeder machine, support frame and discharge chute. The unit may be adaptable to your specific operation. Write for Bulletin 3318.

OTHER EXACT WEIGHT EQUIPMENT

SELECTROL® AUTOMATIC CHECKWEIGHERS

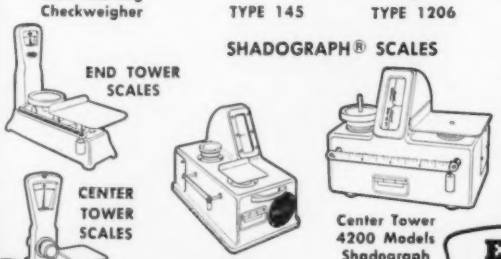


TYPE 1250 Case and Bag Checkweigher

TYPE 145

TYPE 1206

SHADOGRAPH® SCALES



END TOWER SCALES

CENTER TOWER SCALES

End Tower 4100 Models Shadograph

Center Tower 4200 Models Shadograph

High speed, smooth operation and accurate control are among the many advantages of Exact Weight Automatic Net Weighing Machines.

Accuracy is assured by the 1:1 ratio lever-design precision industrial scale incorporated in each machine. A special feature is the over-under indicator dial that enables the operator to observe accuracy of each weighment. Visual indication eliminates the need for checkweighing — stops overweights. Machines are available in capacities from 1 gram to 300 pounds, either fully-automatic or semi-automatic models.

Exact Weight offers counsel for weighing problems based on 45 years of experience in industrial scales for all types of applications. Our recommendations will be tailored to your specific needs . . . and at no obligation. Write for Form 3311.

THE EXACT WEIGHT SCALE CO.

912 W. FIFTH AVE., COLUMBUS 8, OHIO
In Canada: 5 Six Points Road, Toronto 18, Ont.

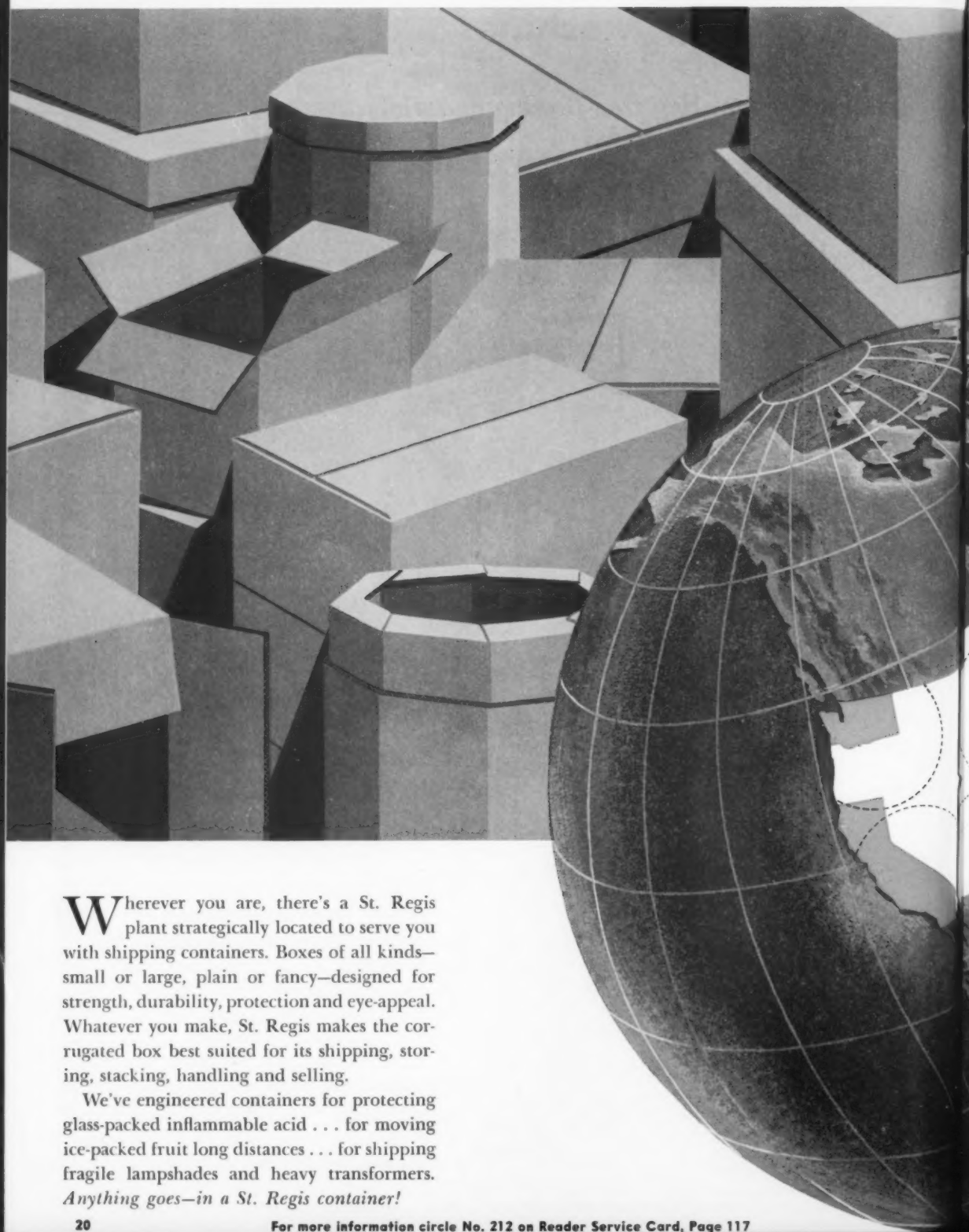
Exact Weight SCALES

Sales and Service Coast to Coast

Find us in your local 'Yellow Pages'

For more information circle No. 211 on Reader Service Card, Page 117

ST. REGIS COVERS THE COUNTRY W

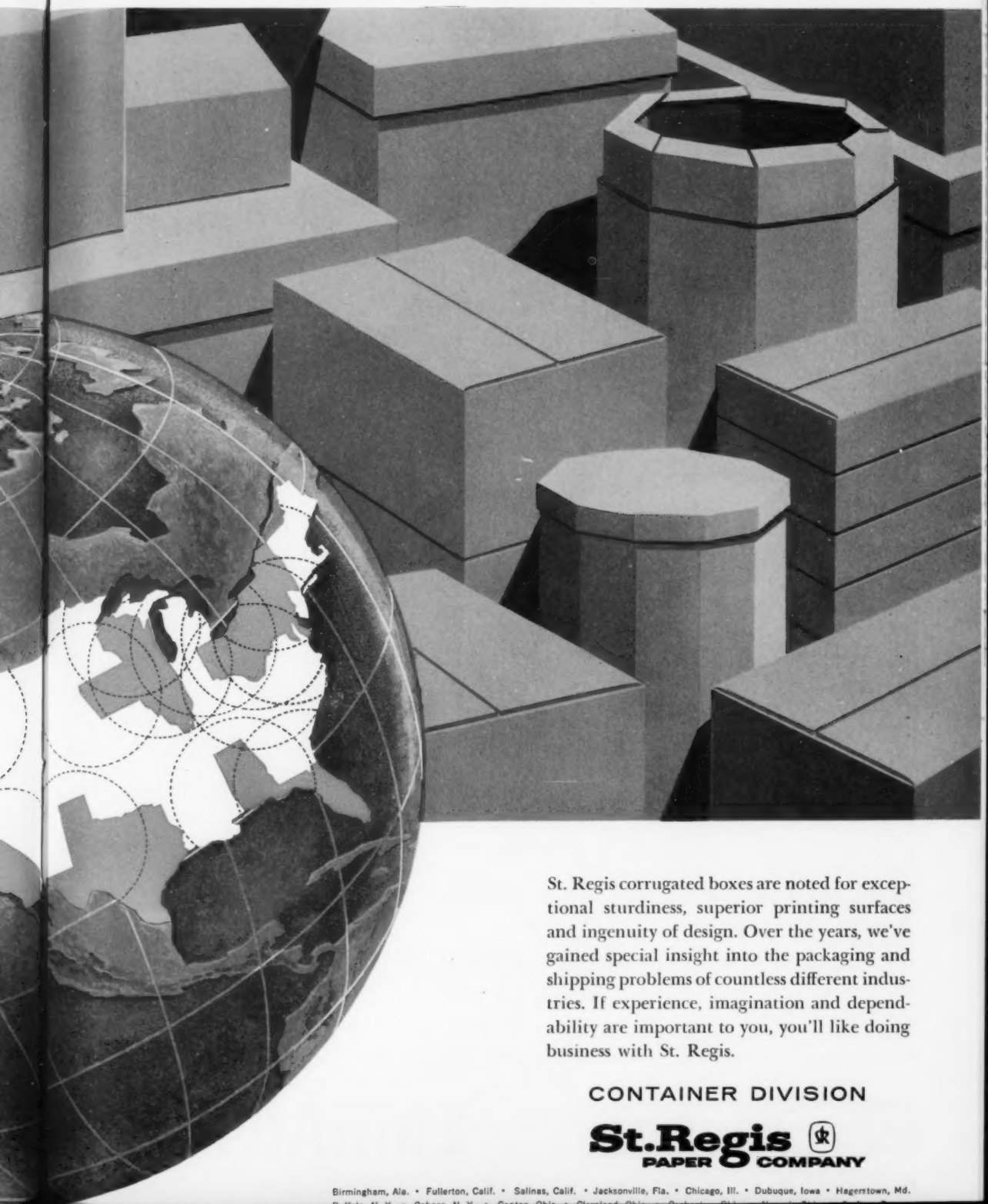


Wherever you are, there's a St. Regis plant strategically located to serve you with shipping containers. Boxes of all kinds—small or large, plain or fancy—designed for strength, durability, protection and eye-appeal. Whatever you make, St. Regis makes the corrugated box best suited for its shipping, storing, stacking, handling and selling.

We've engineered containers for protecting glass-packed inflammable acid . . . for moving ice-packed fruit long distances . . . for shipping fragile lampshades and heavy transformers. *Anything goes—in a St. Regis container!*

For more information circle No. 212 on Reader Service Card, Page 117

RY WITH CORRUGATED BOXES



St. Regis corrugated boxes are noted for exceptional sturdiness, superior printing surfaces and ingenuity of design. Over the years, we've gained special insight into the packaging and shipping problems of countless different industries. If experience, imagination and dependability are important to you, you'll like doing business with St. Regis.

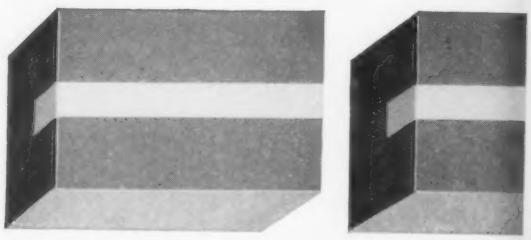
CONTAINER DIVISION

St.Regis PAPER COMPANY

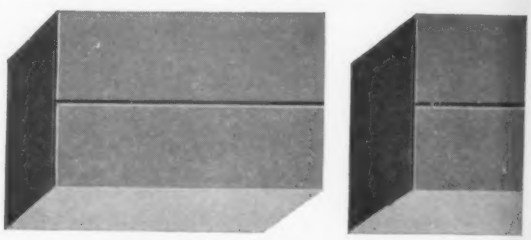
Birmingham, Ala. • Fullerton, Calif. • Salinas, Calif. • Jacksonville, Fla. • Chicago, Ill. • Dubuque, Iowa • Hagerstown, Md.

WHAT CASE SEALING METHOD IS RIGHT FOR YOUR PRODUCT?

AUTOMATIC TAPING?



AUTOMATIC GLUING?



OR GLUE AND TAPE?

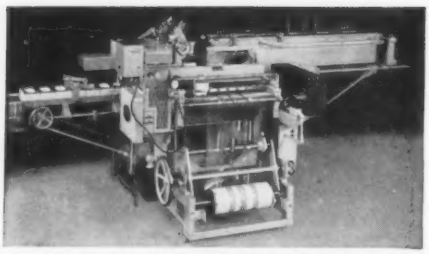
Each of the two basic ways to seal cases has its advantages. One may be better for your product. But which — taping or gluing? Or a combination of both? *Now that the Standard-Knapp line includes a series of proven automatic tape sealing machines, Emhart is in an unusually sound position to help you decide.* Forty years experience in case sealing — thousands of installations to our credit — that's a background with value-to-you written all over it. Tell-all literature is yours for the asking. So is a visit from our nearest sales engineer.

Emhart Manufacturing Company
Portland, Connecticut
Standard-Knapp Packaging Equipment

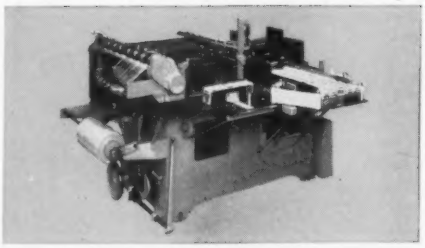
EMHART

For answers on perplexing package-cushioning problems, get this data-packed B.F.Goodrich booklet. Filled with information on what to look for in cushioning materials . . . explains how to select and design package cushioning to reduce damage from shock, vibration. Send request on your company letterhead. The B.F.Goodrich Company, 188 Derby Place, Shelton, Connecticut.

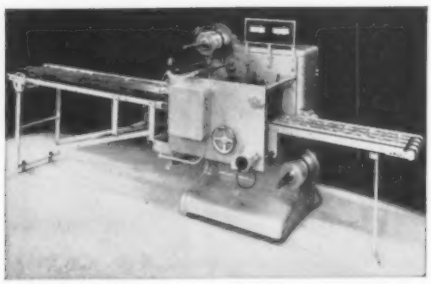
PACKAGE CUSHIONING BY B.F.Goodrich



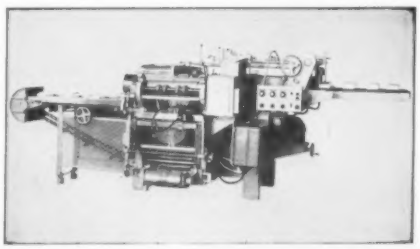
NOW YOU CAN HAVE TOMORROW'S OVER-WRAPPING MACHINE TODAY! Battle Creek's completely new Model 475 successfully handles more than 40 different formulations of soft plastic film . . . your assurance new plastic film developments will not outdate this machine. Change of films requires only electronic heat adjustment. Size changes are made in 15 minutes. Wraps up to 75 per minute within 5″ to 12″ lengths, 3″ to 8½″ widths and ¼″ to 4″ heights. Choose any of these films — polyethylene (medium, low and high density 1 mil and up), polystyrenes, heat sealing cellulose acetates, heat sealing foils, polyvinyl chlorides, cellophanes, polypropylenes or polymer coated films. **Battle Creek *"Continuous Flow"* Packaging Machines, Inc., Battle Creek, Michigan.**



REDUCE COSTS . . . PROTECT PRODUCTS . . . IMPROVE DISPLAYS . . . PROMOTE MULTIPLE SALES with Battle Creek's new Model 850 Automatic Bundler. This machine bundles groups of packages . . . 4, 6, 8, 12 and 24 to a bundle . . . at speeds up to 18 per minute. One operator can easily keep pace with a packaging line as high as 180 per minute. Depending on construction selected, the machine bundles with kraft paper, polyethylene, cellophane and other films; in bundles within 5″ to 12″ long, 4″ to 10″ wide and 1″ to 8″ high. Used for textiles, paper items, drugs, chemicals, cosmetics, food products . . . and/or what have you? **Battle Creek *"Continuous Flow"* Packaging Machines, Inc., Battle Creek, Michigan.**



CHANGE PACKAGE SIZES WITHOUT EXCESSIVE DOWNTIME! Handwheel controls for varying the pouch width, and a simple gear change for varying pouch length, — both made without disturbing the heat-sealing units — provide almost instant adjustability. Thin articles (not necessarily uniform in shape) are pouch packaged between two endless strips of heat-sealing packaging materials at speeds up to 80 per minute. Pouch sizes range from a minimum of 2″ x 2″ x 1/16″ to 27″ x 15″ x 1½″ maximum. The "Flexopaker" is especially applicable for articles in the textile, food, automotive parts, industrial products, hardware or similar industries. High speed "Continuous Flow" performance but with a low price tag. **Battle Creek *"Continuous Flow"* Packaging Machines, Inc., Battle Creek, Michigan.**

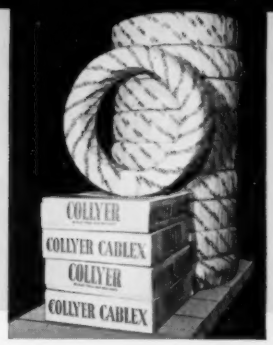


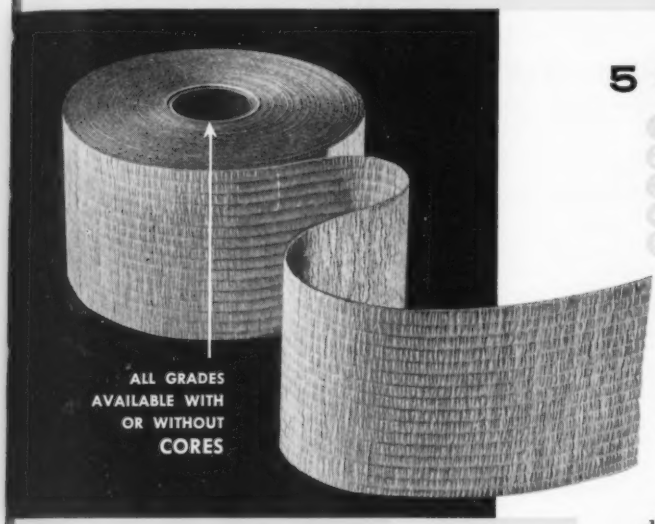
THE SOLUTION TO WRAPPING FRAGILE BAKED GOODS . . . QUICKLY, SAFELY! Battle Creek's Model 43L has been designed specifically for the bakery with the problem of packaging small bakery products . . . such as cookies, iced cupcakes, turnovers and pastries. A machine capable of wrapping from 40 to 70 packages per minute, the Model 43L handles each package gently, smoothly and quickly. Package sizes may vary from 3″ x 1¾″ x ½″ to 10″ x 4½″ x 4″. Wrapping material may be printed or unprinted cellophane, with or without separate top labels. Each package is a miniature bakery "showcase." **Battle Creek *"Continuous Flow"* Packaging Machines, Inc., Battle Creek, Michigan.**

For more information circle No. 215 on Reader Service Card, Page 117

Thilco Protective COIL WRAPS

For Automatic Machine Wrapping of Steel Strapping Steel, Copper and Alloy Wires Aluminum Wire and Extrusions Plastic and Rubber Hose... *and other products*





5 STANDARD GRADES

1. ASPHALT LAMINATED
2. ASPHALT LAMINATED — REINFORCED
3. BLOND LAMINATED — (Non-Staining)
4. BLOND LAMINATED — REINFORCED
5. CREPED KRAFT (Plus Custom Grades)

Featuring Thilco's NEW LONGITUDINAL PLEATING

New, exclusive Thilco LP (Longitudinal Pleating) provides two-way stretch, adds approximately 20% more lineal foot yield to Standard creped grades. This added footage per roll increases machine coil wrapping efficiency by 20% — cuts downtime by reducing the number of roll change-overs, and saves another 20% on storage space. LP increases wrapper flexibility and is especially advantageous for packaging small circumference coils. All Thilco Coil Wraps are available *with* or *without* pleating in standard widths 3" to 5½" or in special widths to order. All can also be trade-mark Print Decorated. Write for details.

NEW CREPED WEIGHTS

Now available in basis weights up to 80 lb./50 lb./60 lb. laminated (50% heavier than previous available weights) or 90 lb. Single-Ply, creped up to 50% stretch.

NEW PALLET LOAD "PUT-UP"

Saves Handling Costs — Increases Efficiency by 20%

Thilco Coil Wraps are compactly stacked on pallets, spindled on dowels at corners, interleaved with Thilco heavy-duty Kraft at 4-roll layer intervals to reduce shifting, then wrapped with an abrasion resistant, water-proof Thilco WRAP-DRI paper blanket which produces a sturdy, weather-resistant packaged unit. This new "pallet packing" method reduces handling costs, saves approximately 20% on storage space, provides immediate on-sight inventory and increases efficiency generally. There are many other advantages you'll want to learn about.

THILCO PAPERS INCLUDE:

- **WRAP-DRI** Waterproof protective papers
- **THILCO-TUF** Stainproof laminated papers
- **VAPOTITE** moisture-vapor barrier papers
- **POLY-COATED** and special treated papers
- **MG and MF** natural and colored krafts
- **GLASSINE** and greaseproof papers
- **SPECIAL BAGS** and case liners

Write for Thilco Brochure containing Coil Wrap Samples and complete descriptive information.

NEW YORK CHICAGO
DETROIT CLEVELAND
KANSAS CITY BOSTON
CINCINNATI CHARLOTTE

Thilco
Functional Papers

THILMANY PULP & PAPER COMPANY
KAUKAUNA · WISCONSIN

840% MORE PRODUCTION of Perfectly Cartoned Units!

Royal McBee Corporation, Hartford, Conn., installed their REDINGTON *AUTOMAX* Cycle Cartoner just a few months ago to carton the three different items in their Roytype typewriter ribbon line illustrated here. Here's their report:

"The machine has done an exceptional job, and has resulted in production increases as follows:

Job A Single Spool Ribbon 230% increase
Job B Standard Twin Pak 840% increase
Job C Portable Twin Pak 670% increase"

We've been getting reports along these lines from *AUTOMAX* users in all areas of packaging. This low-budget, high efficiency machine is proving itself ideal for cartoning *Drugs, Pharmaceuticals . . . Toiletries . . . Food Products . . . Hardware . . . Parts . . . Household Specialties.* Just *one* operator can produce 40—50—60 packages a minute.

Get the illustrated *AUTOMAX* folder which gives detailed specifications, method of operation, capacity, etc. Send for your copy today!

REDINGTON

automax®

CYCLE CARTONER

LOW PRICE:
Under $5000—ready to run.

COMPACT SIZE:
30" wide, 70" long—Weight 750 lbs.
Caster mounted for easy mobility.

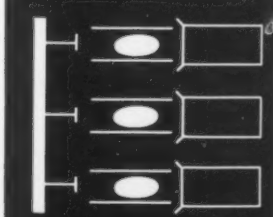
LARGE CARTON RANGE:
Handles cartons
2" to 7" long
1" to 4" wide
¾" to 2½" thick

WHOLE JOB CARTONING:
With one operator, *AUTOMAX* does entire cartoning job automatically . . . no other machine to buy.

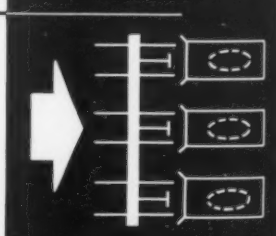
F. B. REDINGTON CO.
3022 ST. CHARLES ROAD, BELLWOOD, ILLINOIS • Chicago Phone:—AUstin 7-4200
Verona, N. J.: CEnter 9-4608

since 1897
REDINGTON
AUTOMATIC MACHINES for CARTONING
WRAPPING • SPECIAL PACKAGING

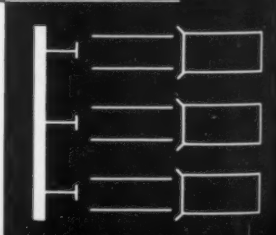
1. Operator places articles in each of 3 troughs.



2. Operator pushes loading handle, filling cartons.



3. Operator returns loading handle to original position and 3 more cartons cycle into loading stations.



The YEAR before Christmas

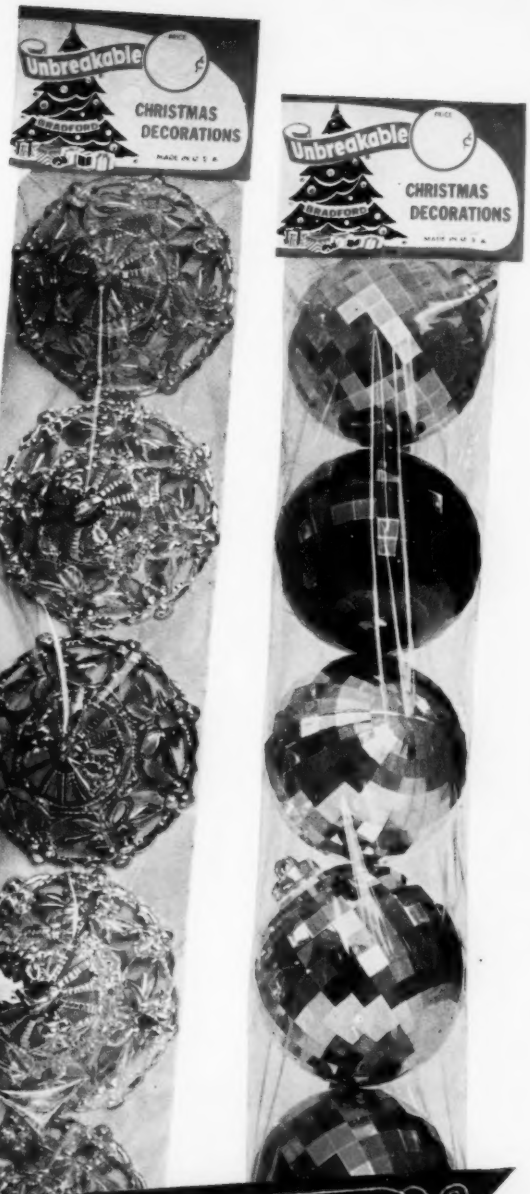
Wrapped, ready and securely protected in VITAFILM

It's safe to do your holiday wrapping early—a *year* early, when the wrapping material is VITAFILM.

In the case of the unbreakable Christmas tree ornaments shown here, the packaging is done as many as 14 months before the contents go on sale. The reason: VITAFILM provides all the protection needed to see the goods through to the ultimate consumer.

This tough, clear Goodyear film seals to a positive welded seam. In addition to long shelf life, it withstands temperature changes, rough handling, doesn't split or run, doesn't attract dust, prints beautifully.

And it adapts readily to all types of automatic packaging machinery. Whatever your product or problem, it'll pay you to investigate VITAFILM. Superior in many ways, unique in some, it's near perfection in low-cost packaging protection. Your Goodyear Packaging Representative can give you further details, or write: Goodyear, Packaging Films Dept. P-6432, Akron 16, Ohio.



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Vitafilm, a Polyvinyl chloride—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

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Labels that last as long as the glass

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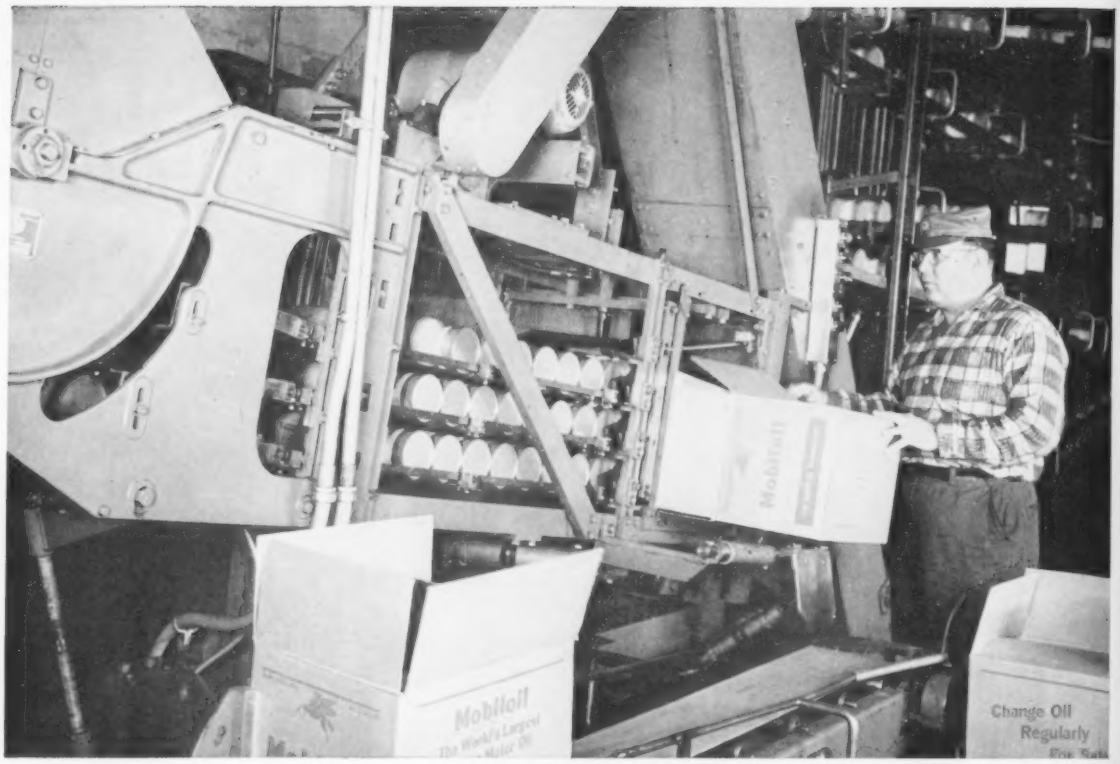

CK/SK SPEED KING pneumatic filled can packer handles up to 25 cases per minute with just one man positioning reshipper cartons. Mechanically operated model is also available.

Mobil Oil Co. running high speed aluminum can line on C&K Speed King packer

Change over from steel to aluminum was accomplished in a matter of minutes

With the installation of Crompton & Knowles can packing equipment, Mobil Oil Co. in East Boston, Mass., has been able to increase line speeds up to 405 cans a minute. As soon as complementary units in the complete line can be brought up to the packer speed, the present 73% productivity gain will be increased to 100% or 575–600 cans per minute.

Although the C&K equipment was originally intended to handle steel quart cans of motor oil, it is now packing aluminum cans of the same size – a change-over that required only minor adjustments.

Experience like this is common when Crompton & Knowles is brought into the packaging picture. With their complete line of case openers, packers, case gluers and sealers . . . plus a wide range of famous WRAP-KING machines for wrapping conventional and odd-shaped products, C&K stands ready to tackle any packaging problem you may encounter. For complete information, including leasing arrangements, write Crompton & Knowles Packaging Corporation, Holyoke, Massachusetts, U.S.A.

FILLED CASES are then closed, glued and sealed on Crompton & Knowles CK/AG Automatic Case Gluer and CK/CU Compression Unit.

CROMPTON & KNOWLES
C&K
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Stands out in PACKAGING

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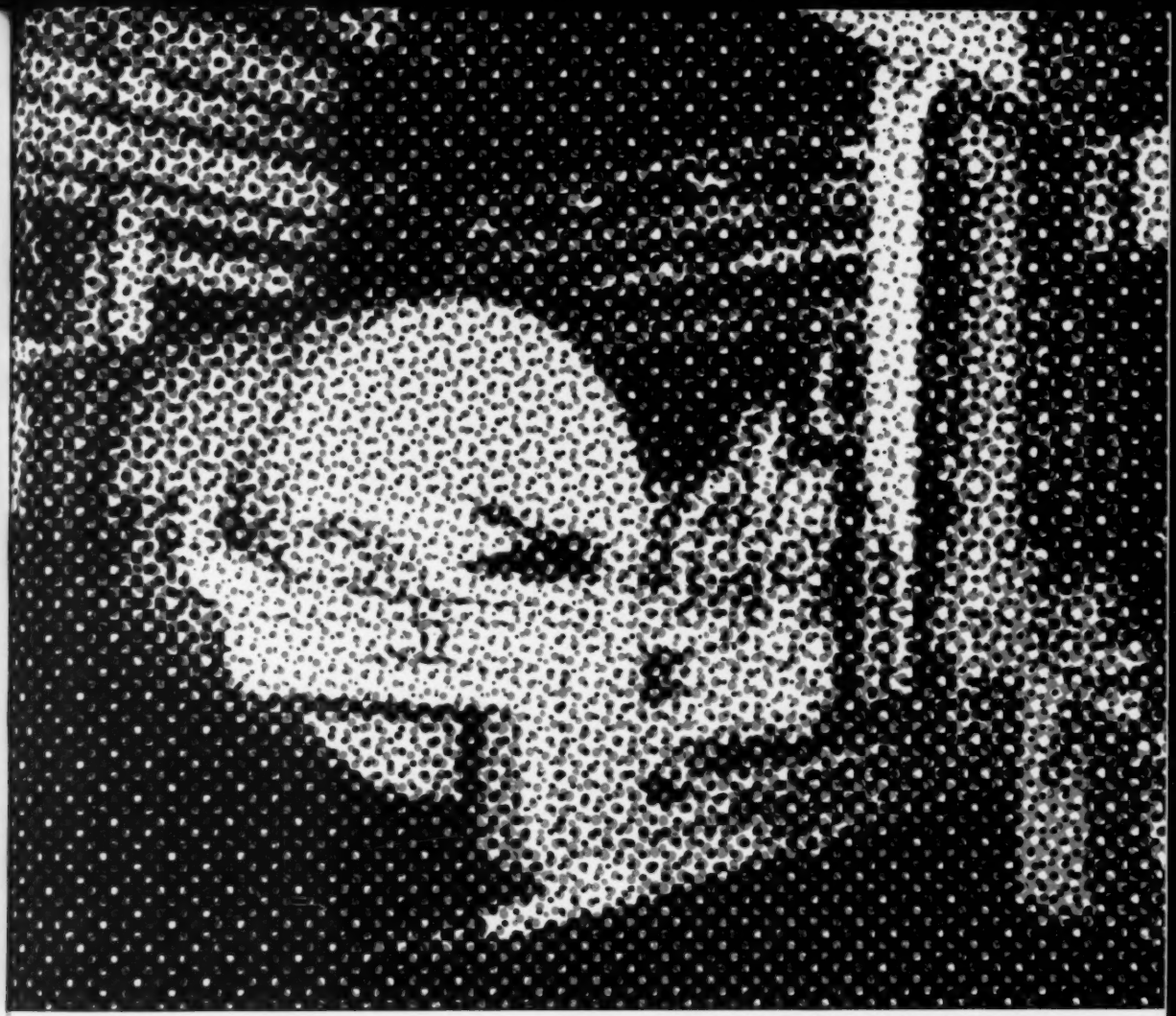


For a new perspective, look at this illustration from across the room.

Crossett Machine Time Plan – new perspective on purchasing paper

"For fourteen hours every month," one Crossett customer likes to say, "I own this paper mill." This is virtually what happens with each of Crossett Paper Mills' regular customers. Each has specific amounts of *machine time* reserved each month for his specific requirements.

The Crossett Machine Time Plan means that Crossett customers can count on getting paper precisely as and when ordered—and always at a fair price.

Crossett Leatherneck Wrapping Paper. Consistent quality in all weights, weight-controlled for customer savings.

Crossett Leatherneck Converting Kraft. Custom-produced to the exact weight and quality needed. Basis weight control assures predictable yardage per ton. Crossett Technical Service available to customers.

Crossett Food Board. Cylinder machine production places long and short fibers precisely where needed for every packaging and printing requirement. Crossett Technical Service helps with customer problems.

Crossett
PAPER MILLS

A Division of The Crossett Company, Crossett, Arkansas, makers of paper, lumber, charcoal and chemicals. All from managed forests.

What's your company's shipping problem? Hard-to-pack contents? Fragile contents? High container costs? Fastening failures? Failure due to moisture?

What?

A Bostitch Economy Man is a container fastening expert. He helps solve shipping problems for companies of all kinds.

After he's checked your shipping room, he's likely to suggest savings in time, labor and materials.

These savings are frequently substantial. They're available to you—through the selection of the most appropriate Bostitch staplers and staples for *your* shipping room. And the Bostitch Economy Man will work that out.

Why not have the Economy Man called in to check your container fastening methods? There are over 300 of them working out of 123 U. S. and Canadian cities. He's listed under "Bostitch" in the phone book.

Fasten it better and faster with

BOSTITCH®
STAPLERS AND STAPLES

864 BRIGGS DRIVE, EAST GREENWICH, RHODE ISLAND

are you still designing square packages for round products . . . when Keyes custom contour packaging can cut costs, cubage and breakage

You can eliminate fillers and dividers while providing better protection against shock by using molded pulp packaging. Keyes can produce contour packaging to your specifications.

For free consultation on your packaging problems, write Product Development Division, Keyes Fibre Company, Dept. PE-4, Waterville, Maine.

KEYES
MOLDED PRODUCTS

Versatile new Packmaster

Packages hard and soft goods in heat-sealable films, foils, and papers at rates up to 150 per minute

You can package an unlimited variety of hard or soft goods — one or many pieces to a package — rapidly and economically with the all-new Model 50-A Sundstrand-Packmaster.

Packages ranging from 2″ to 8″ wide and 2″ to 16″ long may be transparent or opaque both sides, or transparent one side, opaque the other — using heat-sealable films, foils, and flat or crepe papers, with plain or serrated web seals for commercial or military use.

Automatic counting and package cutoff (single package or multiple die cut strip form) are standard. A dotting mechanism for identifying a predetermined number of packages is optional as are several types of automatic printers.

Change-over is an easy 10 to 15-minute operation for a single operator as illustrated at the right. For continuous, high-volume production, machines are available with automatic feeding mechanisms.

For complete information, visit booth 1224-1226 at the Packaging Exposition April 4-7, or write:

MARK OF SUNDSTRAND RELY-ABILITY

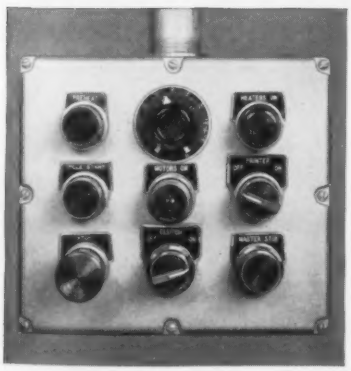
SUNDSTRAND-AMERICAN BROACH

ANN ARBOR, MICHIGAN • DIVISION OF SUNDSTRAND CORPORATION

designed for quick change-over

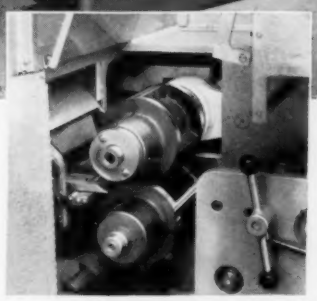
Available for manual or automatic loading of pusher feeder mechanism

Can be completely changed over in 10 to 15 minutes!



Pushbutton operation. Control of all machine functions is conveniently located at a central station.

Quick change of the feed table is accomplished by easy repositioning of pushers on the drive chains.



Quick change of sealing rolls is accomplished simply by releasing air pressure, removing two screws, sliding rolls off arbor and replacing with another set — a 10-minute operation.

HOERNER-DESIGNED CORRUGATED SAMPLER TRAY HELPED GAIN

2500 NEW DAIRY FOOD CUSTOMERS

Rochester Dairy, Rochester, Minnesota, came up with a unique program for getting their dairy products used in the homes of prospective customers . . . a sampler tray containing each of the products processed by the dairy. The driver-salesman presented a tray to each prospect on his route.

The problem was to obtain an economical tray that was attractive and could hold all the products sold by the dairy.

A Hoerner Packaging Engineer* was called in. He worked with Rochester Dairy personnel and solved the problem by designing the corrugated tray pictured above. All the dairy's products, plus a sample of eggs were presented in the colorful Hoerner corrugated sampler tray.

DID THE IDEA WORK?

As a result of this promotion Rochester Dairy opened up 2500 new dairy food accounts! It's another example of the versatility of the Hoerner Packaging Engineer in the field of specialty design.

HOW A HOERNER PACKAGING ENGINEER CAN HELP YOU

If you package things — or if you have a packaging design problem, call the Hoerner plant nearest you. A Packaging Engineer will study your operation without obligation. He can increase your profit margin by giving economical, practical help in reducing packaging costs. All through improved packaging with corrugated. Call today.

**The Packaging Engineer responsible: L. H. Hildebrandt.*

HOERNER BOXES, INC.

Corrugated Specialists for Mid-America

GENERAL OFFICES: 600 Morgan St., Keokuk, Iowa. **PLANTS:** Keokuk, Des Moines and Ottumwa, Iowa; Sand Springs, Oklahoma; Minneapolis, Minnesota; Fort Worth, Texas; Sioux Falls, South Dakota; Fort Smith and Little Rock, Arkansas; Springfield, Missouri; Tupelo, Mississippi. **ASSOCIATE:** Cajas y Empaques Impermeables, S.A., Mexico City D.F., Mexico

CUT COSTS

SPEED

pressure-sensitive

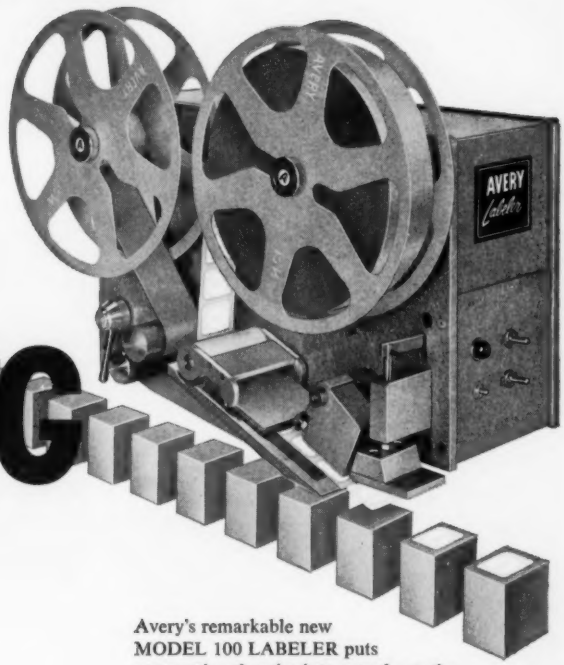
LABELING

with the new

AVERY

fully automatic

LABELER

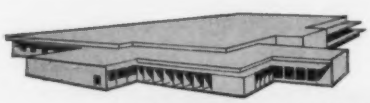


Avery's remarkable new MODEL 100 LABELER puts cost-cutting theories into actual practice. Completely automatic, it applies *individual die-cut pressure-sensitive labels in exact register* on most all surfaces with amazing efficiency and speed.

Fed from a roll which can supply up to 20,000 labels without reloading, Avery's MODEL 100 LABELER easily can apply from 40 to 300 pressure-sensitive labels a minute!

Developed by Avery, the originators of pressure-sensitive labeling, the automatic MODEL 100 LABELER incorporates real mounting versatility and may be modified substantially to meet individual requirements. If high quality labeling and unusual economy would be welcome in your operation . . . this Labeler is worth your strict investigation . . . today.

WRITE FOR FULL DETAILS NOW!
there's no obligation



Always ask for **AVERY LABELS**
what a difference they make!

AVERY LABEL COMPANY, DIV. 179
117 Liberty St., New York 6 • 608 S. Dearborn St.
Chicago 5 • 1616 S. California Ave., Monrovia, Calif.

☐ Please send me further details on how Avery Labels can save me time and money.
☐ Please have your sales representative call soon.

Name_____

Company_____ Title_____

Address_____

City_____ Zone____ State_____

P.S. AVERY FILE FOLDER LABELS, CORRECTION TAPE, PHOTOMOUNTS, AND PRICE MARKING LABELS ARE AVAILABLE AT STATIONERS EVERYWHERE.

NOW! FROZEN STRAWBERRIES WITHOUT A CAN OPENER!

Fibreboard Again Solves Industry Need–With New Fibrematic® Container. The nation's leading frozen food companies are now packaging frozen strawberries in Fibrematic. With its built-in plastic-coated liner, Fibrematic: provides better protection at lower cost; fills easier and faster*; *opens quickly without any utensils.* And future product applications for liquid-tight Fibrematic are virtually unlimited!

Fibrematic exemplifies Fibreboard's ability to serve you. Fibreboard is the only major carton and container manufacturer in the U. S. whose entire marketing effort... scientist to salesman... is organized to meet the marketing problems in your specific industry. And for actual package production, Fibreboard's facilities are the largest, most modern in the whole wide West!

For any possible packaging assistance, phone or write: Fibreboard Paper Products Corporation, 475 Brannan Street, San Francisco, California.

Where Specialists In YOUR Market Work On YOUR Packaging Needs...

FIBREBOARD

Chicago, Denver, Los Angeles, New York, Omaha, Seattle and other major cities.

Fibreboard also serves the West with its complete line of building and decorating materials ... marketed under the Pabco banner since 1884.

* 200 per minute

Is Packaging Machinery Economical Enough?

Economy is a favorite subject of equipment buyers who are looking for ways to cut their costs. As a result, everybody talks economy because everybody wants economy. But how "economical" is economy supposed to be?

Obviously, your product has to look good to the consumer. Yet it must go into the package fast and with the least cost. The more time, labor and money it takes, the less you have left for profit.

With costs and competition going the way they are, economy has got to be a lot more "economical" than it used to be. Not only for products you're already packaging automatically, but for those you haven't even considered. Because automatic *packaging saves you money and improves your competitive position. That is, if it's economical* enough.

HOW *ECONOMICAL* DO YOU THINK PACKAGING MACHINERY SHOULD BE?

Take the example of a machine that automatically forms, fills, and seals bags—it can package anything from hardware to peas and beans. Your product may be entirely different, but look how much economy you must get from the packaging machine itself.

The machine should be simple in all ways. Without unnecessary complexity, it can do its work better and with less cost. And that savings in time, labor and care add to your profit.

You can really save
with the Triangle Bag Former, Filler and Sealer
—basic single-tube design . . . no involved adjustments . . . needs less operating attention and maintenance than normally expected.

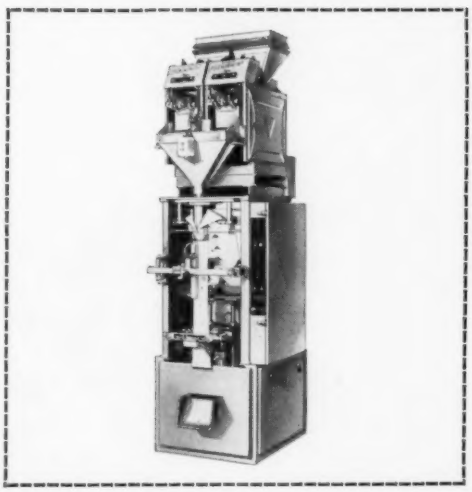
The machine should be fast. Because greater output per minute costs less per unit. And that lower cost gives you competitive advantage *and* more profit.

You can really save
with the Triangle Bag Former, Filler and Sealer
—55 bags per minute output—consistently . . . equal to complex twin-tube designs in many cases.

The machine should be versatile. Your line already includes more than one product in more than one package size. And, there are even more in the future. Bagging materials will change as well. But a new machine for each is not economical. Nor is costly downtime for machine change-over.

You can really save
with the Triangle Bag Former, Filler and Sealer
—handles all heat sealable materials . . . fast, simple change-over without delicate or involved adjustment.

How *more* economical could packaging machinery be? Simplicity of design, speed of operation and versatility for present and future needs—*these* are the efficiencies that the truly economical machine must have.



Regardless of what kind of product you're packaging, see Triangle when you are considering packaging equipment. We don't make equipment for *every* packaging need, but why take the chance of overlooking the real advantage our equipment offers you.

Write and describe your packaging needs. Let us send our full color 3-D slides and viewer of the equipment that will do your job (post paid both ways). No obligation, of course.

35 YEARS

•••••YOU REALLY SAVE WITH•••••

TRIANGLE
PACKAGE MACHINERY COMPANY

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Milprint builds flexible packages to the specific requirements of your product—two layers, or a dozen if need be. At Milprint solutions to package problems are never arranged to favor a particular material or printing process. There's no need to because *Milprint offers you the widest variety available anywhere.* Your next package can benefit from this "open mind" approach by the pioneer in flexible packaging. Your custom combination package will be produced by a nationwide research, design and production organization with 61 years experience. The result? More protection, more sales sizzle for your product at economical cost. Now is a good time to discover . . .

MILPRINT PACKAGING *gives your product* MARKETING POWER

MILPRINT Inc., World's Most Constructive Flexible Packaging Service, General Offices, Milwaukee, Wis., Sales Offices and plants conveniently located across the nation.

For more information circle No. 229 on Reader Service Card, Page 117

Always ready
with packages when you have a Tick–

Do changes in product specifications sometimes leave you without the proper packages? Get a Tickometer and imprint packages as you need them—easily, cheaply with impressive reductions in package inventory, printing costs and waste.

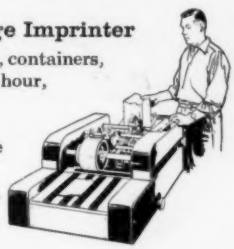
• With a Tickometer, you can imprint weight, size, grade, color, quantity, price, date or code—on wrappers, bags, inserts, envelopes, labels, small cartons—from 400 to 1,000 pieces a minute. Prints from type slugs, rubber mats, or electros; handles most weights and finishes of paper, and light board, in sizes as large as 15 by 15 inches. Feeds and stacks automatically, easy to set, can be operated by anyone.

• The Tickometer can be used to stamp, mark, cancel, sign, date and code—checks, coupons, cards, tickets, tags, sales slips, etc. It is also a precision counting machine, so accurate banks use it to count currency.

• The Tickometer can be leased or bought. Pitney-Bowes service is available from 304 points. Call the nearest Pitney-Bowes office for a demonstration. Or send coupon for free illustrated booklet and case studies.

Model 4800 Package Imprinter

Imprints folding cartons, containers, bags, etc. up to 7,500 an hour, as needed—reducing inventories and waste. No tools required, can be operated by anybody. Ask for a demonstration, or send coupon.



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TICKOMETER

Imprinting & Counting Machine

Made by the originator of the postage meter . . . offices in 132 cities in U.S. and Canada.

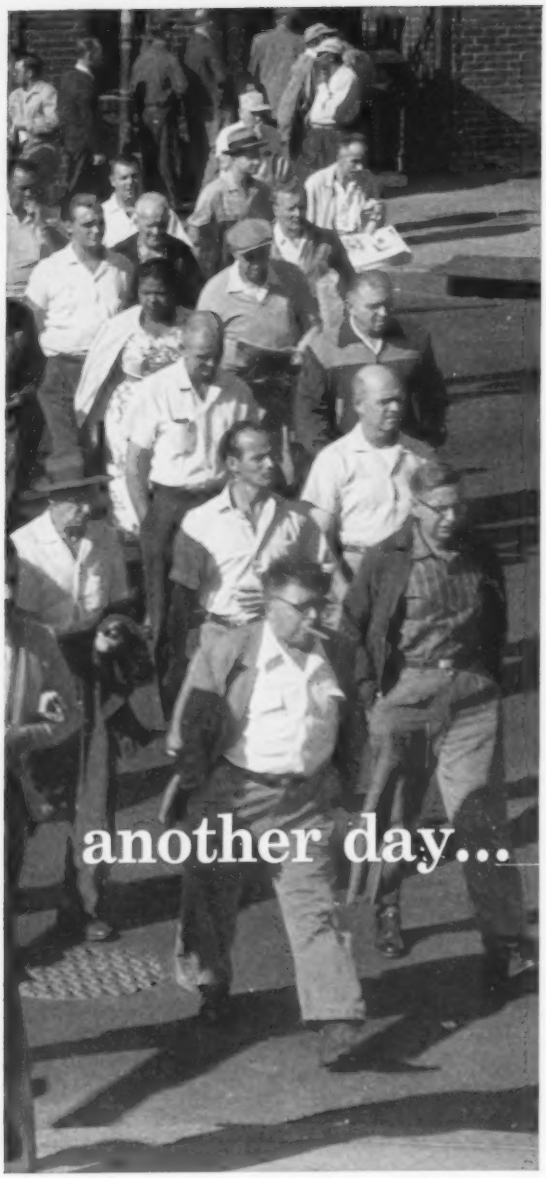
PITNEY-BOWES, INC.
7732 Walnut Street
Stamford, Conn.

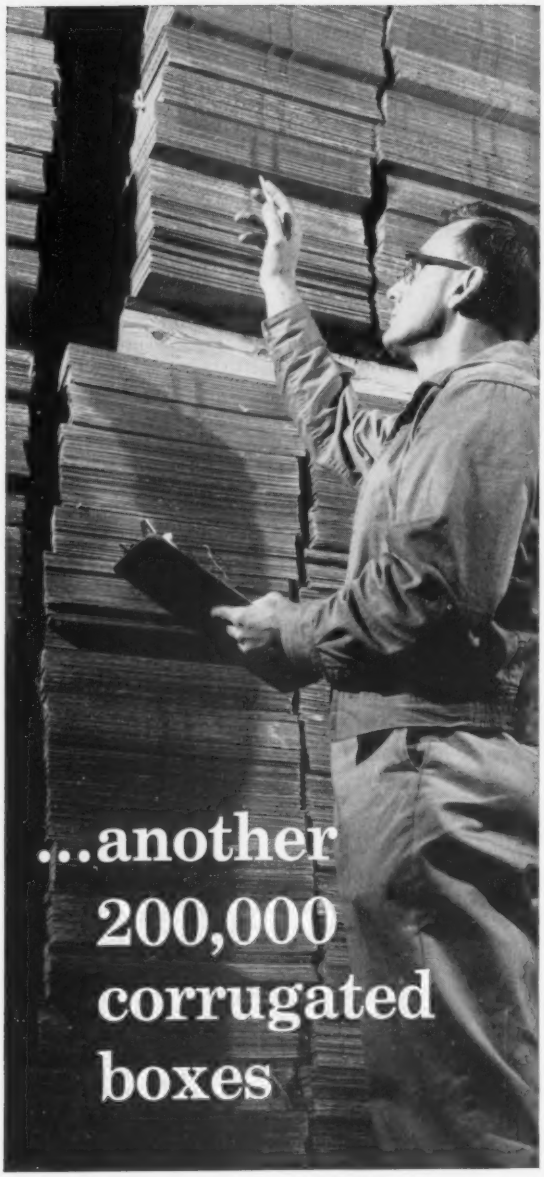
Send free illustrated booklet on:

☐ *Tickometer* ☐ *Package Imprinter*

*Name*_____

*Address*_____





In an eight-hour shift, Hinde & Dauch's Chicago plant (just one of seventeen) manufactures as many as 200,000 standard regular slotted boxes. This *volume capacity* is important to H & D customers. It assures them of a virtually limitless supply, a highly reliable source of the boxes they need for sustained production. After all, isn't this the kind of supplier support you'll be demanding during the competitive months to come?

Hinde & Dauch Division

West Virginia Pulp and Paper

HINDE & DAUCH DIVISION, WEST VIRGINIA PULP AND PAPER, SANDUSKY, OHIO • 17 PLANTS • 42 SALES OFFICES

The advance of irradiation of foods in their packages, as a method of preservation, has presented questions about the stability and interaction of foods and containers when they are irradiated. To obtain answers, on a theoretical basis, to some of the questions, the authors used model foods in this experimental study which they describe along with results. Here's what happened:

► Solutions of acetic acid, sugar, and sodium chloride proved easy to package; vegetable oil and lactic acid were very difficult.

► Irradiation doses of 6 megareps caused some deterioration in physical properties of high-density polyethylene and polychlorotrifluoroethylene; they produced some discoloration in rubber hydrochloride, polyvinyl chloride-acetate, and polyvinylidene chloride.

► Irradiation produced objectionable odors in all films, but the odors were weakest in polychlorotrifluoroethylene and polyvinyl chloride-acetate.

► Two laminates, polyester-polyethylene and polyethylene-aluminum-polyester-polyethylene were the most successful packages for difficult liquids.

Testing packages for irradiated foods*

Using model foods to study compatibility of plastic packaging films with representative food components—when the package with product is subjected to irradiation

By Charles E. Feazel, Jr., Robert E. Burks, Jr., and B. C. Moses,
Southern Research Institute, Birmingham, Alabama,
and George E. Tripp,
Quartermaster Food and Container Institute, Chicago

Radiation preservation of foods presents some new problems to the packaging technologist. Foods which formerly could be distributed only with the aid of refrigeration or heat sterilization now can be preserved or distributed in the raw state at ambient temperatures.

Flexible plastic films have many advantages for packaging foods sterilized by irradiation; but their use poses problems of compatibility between the food and the packaging film. One such problem is that the packages are required to retain their physical integrity during normal handling after receiving radiation doses up to 6 megareps† to insure sterilization.

The effects of ionizing radiations on the physical properties of plastics have been investigated by numerous workers *(1, 2, 3, 4)*. Both fragmentation and cross-linking of polymers occur. However, no previous study has been made of the interaction of plastics and foods while being irradiated.

Objectives Of The Study

Our object in this investigation was to study the performance of typical plastic packaging films used to package irradiated foods. The study was designed to answer the following questions:

A. What is the effect of irradiation on the functional properties of the container?

B. What is the effect of the food itself on the functional properties of the container?

C. What kind of interaction is to be expected between these two factors?

We chose the following model foods:

1. 5 per cent aqueous sodium chloride, to represent a neutral salt solution;
2. 5 per cent aqueous lactic acid, chosen because it is a potent agent for the production of stress-cracking of plastic films;
3. 5 per cent aqueous acetic acid, as a typical organic acid;
4. 4 per cent aqueous methionine, as a typical amino acid;
5. 5 percent aqueous sucrose, as a typical sugar;
6. Cottonseed oil, as a typical fat;
7. Cottonseed oil-vinegar emulsion, as a typical salad-oil type of food;
8. Water, to provide a medium for detecting odor production in films.

We tried to select examples of all types of commercial plastic films that might be expected to be suitable for packaging foods. Some of the films were given only a very limited evaluation, since it was evident that they would have limited utility. The present report discusses

*This paper reports research undertaken in cooperation with the Quartermaster Food and Container Institute for the Armed Forces, QM Research and Engineering Command, U. S. Army, and has been assigned number 1060 in the series of papers approved for publication. The views or conclusions contained in this report are those of the author(s). They are not to be construed as necessarily reflecting the views or indorsement of the Department of Defense.

†A "rep" (roentgen-equivalent-physical) is defined as the quantity of ionizing radiation required to produce an energy absorption of 93 ergs/gm. of tissue. The "rad" is often used as a unit of radiation dose. A rad is the amount of ionizing radiation required to produce an energy absorption of 100 ergs/gm. of water. To convert from reps to rads, multiply by 0.93.

TABLE I

Summary Of Observations On Irradiated Packages Of Model Foods

Film	Food					
	Sodium Chloride	Lactic Acid	Acetic Acid	Sucrose	Methionine	Cottonseed Oil
Polyethylene, low density	C*	.....	.....	.....	.....	.....
Polyethylene, high density	C*	C*	.....	.....	.....	C*
Scotchpak	.....	A	.....	.....	.....	A
Polyethylene-Mylar	A	C	C	A	B	.....
Polyethylene-cellophane	A	C	A	A	A	C
Polyethylene-aluminum Mylar-polyethylene	A*	A*	.....	.....	.....	A*
Polyethylene-saran	B	C*	.....	.....	.....	B*
Saran 6D	.....	C	.....	C	.....	.....
Polyvinyl chloride-acetate	C*	C*	.....	.....	.....	C*
Kel-F	C*	C*	.....	.....	.....	C*
Pliofilm	.....	B*	.....	.....	.....	.....

Ratings: A, satisfactory; B, questionable; C, unsatisfactory. Ratings marked * were made on the basis of limited evaluation (tensile strength after no storage or 1-mo. storage, following irradiation).

TABLE II

Effect Of Radiation On Peel-Seal Strength Of High-Density Polyethylene Bags Containing 5 Per Cent Sodium Chloride

Time Stored* (wk.)	Radiation Dose (reps)			
	0	1	3	6
	Peel-Seal Strength† (lb./in.)			
0	4.5	4.3	4.0	2.2
4	4.9	4.3	3.1	0.9

*Recorded time for storage was in addition to shipping time which varied from 1 to 2 wk. The conditions of storage were 90% R.H., 100° F.
†Original bags: 7.8 lb./in.

only the most versatile films of those tested. Listed below are the films reported on:

a. Polyethylene, low density, 0.0011 in. thick,

b. Polyethylene, high density, 0.0011 in. thick,

c. Scotchpak, Type 25A6, 0.0025 in. thick, Type "A" heat-sealable combination of polyester and polyethylene,

d. Polyethylene-Mylar polyester, 0.0005-in. Mylar coated one side with 0.0015 in. polyethylene,

e. Polyethylene-cellophane, 0.0009-in. cellophane coated one side with 0.002 in. polyethylene,

f. Polyethylene-aluminum-Mylar-polyethylene, 0.0005-in. aluminized Mylar coated both sides with 0.001 in. polyethylene,

g. Polyethylene-saran, 0.0005-in, saran coated one side with 0.0025 in. polyethylene,

h. Saran Wrap 6D, 0.002 in. thick,

i. Polyvinyl chloride-acetate, plasticized and unplasticized, 0.0015 in. thick,

j. Kel-F, polychlorotrifluorethylene, 0.005 in. thick,

k. Pliofilm 235 MW, rubber hydrochloride-nitrile rubber, 0.0024 in. thick.

The tests used for the evaluation of the films were selected to give information about the functional properties of the films that were considered important: strength and water vapor transmission. The tests for strength were tensile strength and elongation, tear resistance, peel-seal strength, and burst strength. The films were tested for these properties after irradiation in the presence of the model food, and after the irradiated food package had been stored under conditions leading to accelerated deterioration of the package.

Limitations Of The Study

We recognized, of course, the problem of obtaining representative samples of each type of film. Most of the film samples were obtained from converters in the form of bags, usually 4x6 in., and supposedly represented production samples. A few films were experimental types.

It is also obvious that the conclusions we drew from our experiments on any given film may not apply to the same type of film manufactured subsequent to our work. This is true particularly of the difficulties we encountered with delamination and leakage at bag seams. It is reasonable to expect that improvements are continually made in manufacturing that will minimize these problems.

EXPERIMENTAL

The bags were filled with the model food, closed by heat sealing, and put in No. 2 cans, two to a can. The cans were shipped to the Materials Testing Reactor, Arco, Idaho, where they were irradiated with gamma radiation at dose levels of 1, 3, and 6 megareps. Control samples, which received no radiation, were also included in the shipment.

Upon return from the Materials Testing Reactor, the physical properties of the films were measured.

TABLE III

Elongation Of High-Density Polyethylene As Affected By Irradiation

Package Contents	Time Stored* (wk.)	Radiation Dose (reps)			
		0	1	3	6
		Elongation† (%)			
Sodium chloride solution, 5%	0	490	450	225	< 10
Sodium chloride solution, 5%	4	500	500	225	< 20
Lactic acid solution, 5%	0	500	115	< 10	< 10
Cottonseed oil	0	500	125	125	125

*Recorded time for storage was in addition to shipping time which varied from 1 to 2 wk. The conditions of storage were 90% R.H., at a temperature of 100° F.
†Original bags: 500%

TABLE IV

Peel-Seal Strength Of Polyethylene-Mylar Bags Containing 5 Per Cent Sodium Chloride Solution

Time Stored* (wk.)	Relative Humidity (%)	Radiation Dose (reps)			
		0	1	3	6
		Peel-Seal Strength † (lb./in.)			
0	.....	9.3	4.0	4.3	4.0
1	15	6.1	5.2	4.3	4.2
1	90	5.2	4.3	4.2	4.9
9	15	5.6	5.6	5.1	4.7
9	90	6.0	3.7	4.8	4.5
Average	.....	6.4	4.6	4.5	4.4

*Recorded time for storage was in addition to shipping time which varied from 1 to 2 wk. The conditions of storage were 100° F. at the relative humidity noted.
†Original bags: 6.7 lb./in.

TABLE V

Elongation At Break, Machine Direction, Of Polyethylene-Cellophane Bags Containing 5 Per Cent Sodium Chloride Solution

Time Stored* (wk.)	Relative Humidity (%)	Radiation Dose (reps)		
		0	1	3
		Elongation † (%)		
0		60	61	29
1	15	48	59	52
1	90	83	34	29
9	90	71	33	61
Average		66	47	43

*Recorded time for storage was in addition to shipping time which varied from 1 to 2 wk. The conditions of storage were 100° F. at the relative humidity noted.
†Original bags: 58 %

TABLE VI

Peel-Seal Strength Of Polyethylene-Mylar Bags Containing 5 Per Cent Acetic Acid Solution

Time Stored* (wk.)	Relative Humidity (%)	Radiation Dose (reps)			
		0	1	3	6
		Peel-Seal Strength † (lb./in.)			
0		4.2	3.7	4.0	4.6
1	15	4.3	4.4	4.6	4.1
1	90	3.9	3.9	4.0	3.9
9	15	4.0	3.3	3.8	3.9
9	90	3.9	4.0	4.3	4.1
Average		4.1	3.9	4.1	4.1

*Recorded time for storage was in addition to shipping time which varied from 1 to 2 wk. The conditions of storage were 100° F. at the relative humidity noted.
†Original bags: 6.8 lb./in.

Samples were incubated at 100° F., 90 per cent R.H., and at 100° F., 15 per cent R.H. After incubation for one week and for two months, the physical properties of the films were measured.

The combination of the differences, in type of film, type of food, irradiation dose, and storage conditions resulted in a large number of possible experiments. This number was reduced by the elimination of some combinations as the program proceeded, and as it became evident which combinations were the most significant to the packaging of irradiated foods.

Physical Tests

The physical tests used were:

1. **Tensile strength and per cent elongation,** as determined on a Scott IP4 machine by ASTM Method D882-49T, with specimens 1 in. wide, clamped with 1 in. between jaws.
2. **Tear resistance** by ASTM Method D689-44, on a specimen 2.5 x 4.0 in.
3. **Peel-seal strength,** ASTM Method D882-49T, on specimens 1 in. wide, cut from package seams and tested on a Scott IP4 machine.
4. **Burst strength,** ASTM Method D774-46 ("Mullen Burst").
5. **Water vapor transmission rate,** as measured by two methods: ASTM Cup Method D697-42T, or by sealing calcium chloride in a bag of the film and determining the rate of weight gain at 50 per cent R.H., 73° F.

RESULTS

Table I shows the results that were obtained on the six most versatile films evaluated. As indicated in the table, some of the films received a more thorough evaluation than others. The following is a discussion of these results and results on some of the other films that were examined.

The majority of films studied were not appreciably damaged by gamma radiation up to 6 megareps. Model foods caused some changes in physical properties of the films. Some trouble was caused by leakage of the foods at the bag seams, due partly to poor seals, but partly due to stress-cracking of the plastic by the food. In most cases, we were able to perform the tests on the manufacturers' seals rather than our own.

Radiation caused deterioration of the following films as noted:

Peel-seal strength (Table II) and per cent elongation at break (Table

(Continued on Page 121)

Charles E. Feazel, Jr., head of the applied chemistry division at Southern Research, received his A.B. degree from Harvard University and his Ph.D. degree from the University of Maryland. Prior to joining Southern Research in 1953, he was in chemical and plastics research at the B. F. Goodrich Co. and the Johns Hopkins University's applied physics laboratory.

Robert E. Burks, Jr., head of the organic section at Southern Research, was graduated from the Georgia Institute of Technology with a B.S. degree, and received his Ph.D. in organic chemistry from the University of Wisconsin. He has been concerned with the chemistry of foods, particularly flavors, and has studied the types of damage to flavors and packaging films caused by radiation preservation and the synthesis of polymers having special properties.

B. C. Moses is a graduate of the University of Alabama with a B.S. degree in chemistry. He is presently working toward an M.S. degree at Birmingham-Southern College. Since joining Southern Research in 1956, Mr. Moses has worked in the applied chemistry division on several problems, studying the effect of gamma and ultraviolet radiation on plastic films and fibers.

George E. Tripp, chief of container technology branch, food radiation preservation division, received his B.S. degree in chemistry from the University of Illinois. Employed by the Ordnance Corps prior to World War II, he later received his commission in the Air Force and served as a meteorologist. Prior to joining the Institute in 1949, where he has been engaged in research related to food packaging, Mr. Tripp did research on amino acids and rates of aminolysis, emulsion polymerization, and relationships between packages and food.

Using product itself to control and balance packaging line

Philip H. Lanham attended Purdue University and General Motors Institute. After service as an engineering officer in the U.S. Air Force, he was for eight years an engineer in machinery development at Eli Lilly & Company. He joined the Lewis-Howe Company in 1953 as plant engineer. Subsequently, he established the company he now heads. Mr. Lanham is a member of the Engineering Club of St. Louis and of Packaging Institute.

Few installations of packaging line mechanization have aroused more interest than that of the Lewis-Howe Company. Several years' experience with it has confirmed the faith of management, and the judgment of engineers and technical experts who have taken it from "paper and conversation" to a functioning, effective system. While the packaging field has been exposed to some of its highlights, now, for the first time, the engineer who spearheaded its development, offers a thorough explanation of how and why it works. Mr. Lanham also reviews systemation principles, and discusses their application in mechanizing and controlling the Lewis-Howe packaging operation.

Striking out on new lines of development to reach a radically improved technique of packaging line control is often a bewildering and frustrating experience. But there are rich rewards and demonstrable efficiencies for those with the boldness and patience to go through it all.

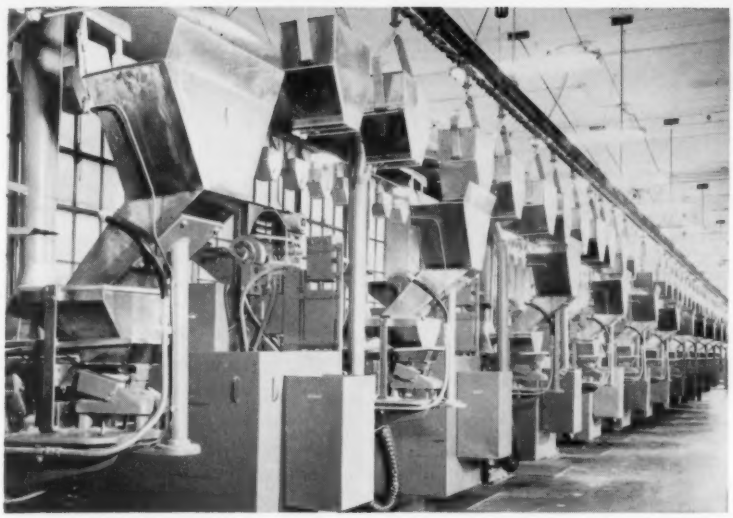
Such has been the case with the management of Lewis-Howe. The goals seemed adequately defined, but the route to them has been full of complications. We inject this note of warning now because the observations in this article often oversimplify a point under discussion. Purpose of the project was to develop a system whereby the product would do the controlling.

Flow Of Tums Packaging

To understand the application of this new system to the Lewis-Howe operations, a review of just how packaging and production flows may be helpful. After processing takes place on the fourth floor, the tablets move to the second floor where finishing, i.e., packaging, takes place. (The third floor is used for storage.) Stainless steel buckets moving on a trolley conveyor carry production from the fourth floor to the battery of 15 Redington roll wrapping machines.

The buckets dump on demand to the bank of roll wrappers, each unit of which prepares wrapped rolls of 12 tablets each and deposits finished rolls, 30 at a time to the master conveyor. This master conveyor has 900 flights, thus providing a storage capacity of 27,000 rolls of Tums. This master conveyor is a co-ordination factor of the system. It delivers these finished rolls to the battery of cartoners.

As needed for cartoning, rolls are taken from the storage conveyor automatically and go through the cartoning operations. At the end of this battery of equipment, cartons move to semiautomatic and automatic casing equipment. From here, filled and sealed cases move



SUPPLYING PRODUCT ON DEMAND to bank of roll wrappers, buckets moving on trolley conveyor carry production from fourth floor to packaging line. At far end of operation, demand for wrapped rolls at cartoners regulates roll wrappers—in turn regulating supply from buckets.

to the first floor of the plant for palletizing and storage.

Getting a balance in the operation and supplying the various packaging machines along a line represents the core of the problem. This made a primary problem — to have a way of furnishing a continuous flow of product to the machines. The trouble is that often one machine gets ahead of another and stands idle, waiting for the other to catch up. This means downtime and loss of production — the very things we sought to avoid.

Cartoners Set Demand

In a nutshell, the system lets the automatic cartoners establish demand for individual rolls of Tums. These reach the cartoners from a storage and transfer conveyor. A key feature of the system is that this conveyor not only receives rolls of product from a battery of roll wrapping machines, but does so intermittently — as the needs of cartoning equipment dictate.

To carry out this objective and develop a system to do this involved devising an intricate system of self-regulation of equipment by means of interlocked and integrated electrical, pneumatic, and mechanical devices.

Results Attained

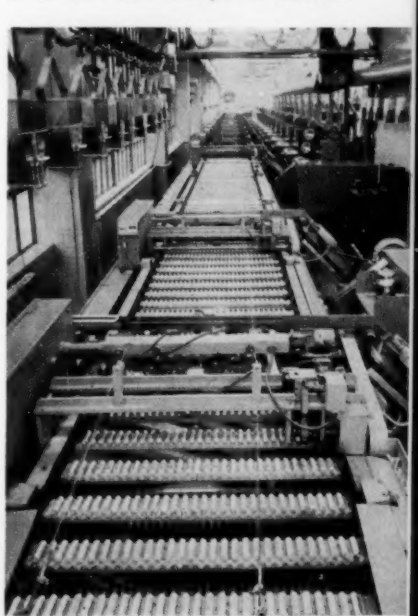
Before looking at the details of this system, it is worth noting that the system is producing results. It permits the plant to run with an extremely low finished goods inventory as it has cut warehouse time from three months to two weeks. It has overcome the problem of continuous product flow from machine to machine. Further, it has provided versatility and flexibility.

Other specific results include better use of manpower, better control of finished production and package quality, and definite cost reduction. There is better safeguarding of both equipment and personnel. Better working conditions result and higher individual wages are possible. We have proved the principles of systemation, i.e., the engineering of the integration of machines into a self-regulating system by letting the product itself do the controlling — through mechanical, electrical and pneumatic means.

The 15 roll wrapping machines now operate as a bank, and production from any of them is available to the storage conveyor without reference to the pattern or sequence of production from any of the other roll wrappers. Thus, the operation is automatic and intermittent.

The basic concept of systemation involves combining system, engineering, and automation. **The product controls the machine rather than the machine controlling the product.** This means that the *presence* or *absence* of product does the controlling. *(Turn page)*

COORDINATING FACTOR of entire operation is master conveyor holding 27,000 wrapped rolls of Tums. Production from roll wrappers moves to conveyor automatically—as do rolls from conveyor to cartoners.



kaging line operations

By Philip H. Lanham,
President,
The Systemation Corporation,
Chesterfield, Missouri

Sensing For Production

To accomplish this control, there must be a production unit. This unit may be a package, such as a bottle or other container, or an item of product, such as a roll of Tums, or a cigar. Also, this unit must have a mass substantial enough to engage a sensing unit. For example, a cigar could be a production unit, but the tobacco making the cigar could not.

Once you determine a sensing unit to sense the production unit and plan a general system using it, you next determine the means and methods of sensing. **This is one of the key points of the general system; it is the essence of gathering information in electrical form for conversion into mechanical form.**

Choice Of Sensing

Means of sensing depend on just what you are sensing. You have a wide choice, ranging from Micro Switches, limit, and the proximity switches to radioactive pickups. Sensing is the start of the process of storing information (such as with an electrical relay) for use in control.

You have to think of sensing in terms of what you are sensing for, specifically. For example, you may sense for the weight, length, and diameter of a roll. As with quality control, you are checking for certain dimensional characteristics or attributes. In a way, sensing is accurate counting.

For peak effectiveness, sensing should involve as large a number of units as practicable. At the Lewis-Howe plant, a group of 30 rolls of Tums provides an optimum sensing unit.

How To "Store Information"

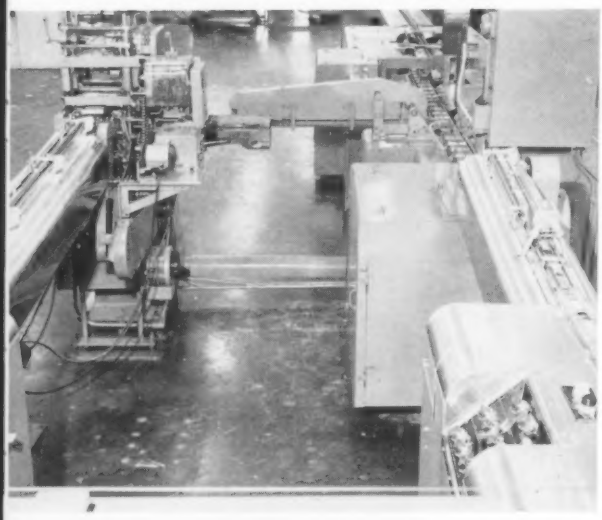
To us, the term "storing information" means using mechanical means to retain an electrical condition for a particular interval. This may be locked in place, as with the latching type of electrical relay. But to avoid discussing all the possible modifications, for simplicity, let's take a simple electrical relay. It reduces a given condition to an individual impulse. Information, as indicated by sensing, goes to the relay which thus serves as a marshalling point.

Input from the sensing means, reduced to an impulse or impulses, thus goes into the relay. The relay receives an impulse and, say, closes a circuit for total operation. Relating this to specific sensing: The sensing means indicates that length, weight, and diameter of a roll are correct; it closes the relay for a particular operation. If any one of the attributes you are sensing is not correct, the circuit does not close. It is "go" or "no go."

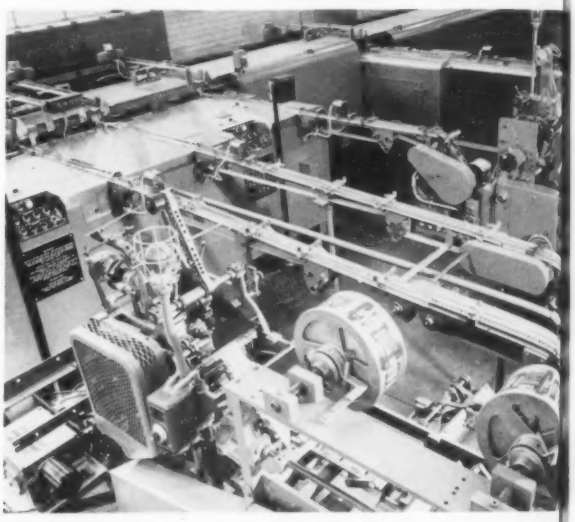
Building Up Conditions

Elaborating on the simple relay, a system may use a series of relays. These may function simultaneously or in sequence – depending on what your particular system is doing. **An important point is that conditions may be locked in a relay and held.**

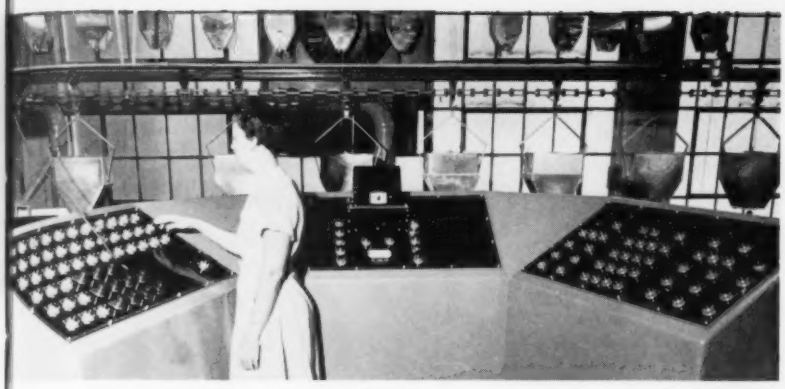
From the impulses, which are received and magnified at the relay or relays, you energize, hold, or cancel. You build up a set of conditions. The relay and its locking or latching permit "holding the status quo" electrically. Although oversimplified for the sake of explanation, the principle is that you use a combination of switches, relays, and so on, to indicate electrically a set of conditions. Once you do this, in all



AUTOMATIC CARTONING LINE integrated with system has roll discharge units, cellophane wrapping machine, and cartoning unit for combination pack. A goal of system was to balance machine loads.



FOUR INTAKE LINES handle production of combination cartons: single rolls, half single and half cellophane-wrapped rolls, all cellophane-wrapped rolls. Integration permits using two to four intakes.



WITHIN ARM'S REACH, operator controls wrapping machines, master conveyor, and automatic cartoning lines from this console. These manual controls maintain timing and balance of units on line. Probable next phase: Automatic timing and phasing coordination by computer.

its combinations and permutations, you are ready for the next step of control — taking corrective action, i.e., to act on the information thus electrically stored.

Using The Action

It depends on what you want to do, such as to hold, accumulate, or correct. In some cases it is just about as easy to take a corrective action as to stop a running machine. You now reduce the electrical impulses to mechanical action. It could be pneumatic or electrical as well as mechanical — perhaps a combination of all three.

A solenoid, for instance, serves to transmit and transform electrical energy (as sensed, as transmitted to the relays and, in turn, transmitted to the solenoid, depending on what happens at the relay) into mechanical, or more typically, to electro-pneumatic-mechanical action and control.

Interlock Vs. Integrate

Relating all this to packaging line operations, we must remember the purposes and effect of this control. Two significant terms applicable here are "interlock" and "integrate." Interlocking is shown where, as a machine stops, it also stops those behind it and lets those ahead of it run out, then reload. Integration goes a step beyond mere interlocking and permits various additional functions, such as reloading after a stop, thus injecting additional elements into the system.

In other words, interlock is basically several switches (usually wired in series) which exercise control over the start-stop conditions of several machines in a line. Since this is an either "on" or "off" control, very limited balancing control is obtained.

Integration on the other hand, provides a *positive* balancing control through self-regulation and is not a matter of an off-on control. For example, various operations can be performed within a given machine or machines while other phases are stopped or slowed, thus providing a very high degree of balance and one which may permit the entire line to continue operating. In addition, many corrective actions can be performed, all of which add up to self-regulation. In addition, a very simple application is variable speed automatically controlled.

Product Does Controlling

All this involves the self-regulation of machines. We think of self-regulation as the ability of a machine to respond to a particular problem at a particular time as related, say, to feed, speed, and jams. It entails many other requirements, such as the ratio of good to bad product or packages, or a no-product, no-function control. But **it all ties in with the basic concept of letting the product do the controlling.** This performs on the basis of just how the product is being transmitted.

Product has to be present according to predetermined standards as measured by the sensing heads. We stress that the entire control system is only as good as the sensing. Further, the sensing relates to the transmitting and use of this information in electrical form. You may need de-energizing instead of energizing. The system may require feedback of information, i.e., exist-

ALL-OUT MECHANIZATION at Lewis-Howe plant has resulted in more available floor space than plant had with its former, spread-out, practically nonintegrated operation, leaving room for maintenance ease, future expansion. Note use of automatic elevators and overhead conveyors.

ing conditions electrically recorded, which means reducing them to electrical impulses to signal the appropriate system components at the right time.

Wanted Balanced Loads

Just how involved a particular system may be depends on its special objectives. As noted elsewhere in this article, the purpose of letting the product do the controlling at Lewis-Howe was to get a proper balancing of loads among the different units of packaging machinery, integrating their control, raising productivity per manhour, and cutting warehouse time from three months to two weeks.

Applying the concept of systemation to the Lewis-Howe packaging operations, we see that demand for product at the cartoning equipment regulates the flow to this machinery on the main (storage conveyor) and, in turn, demand by the conveyor regulates the flow of production from the 15 roll wrapping machines. These machines get their product (Tums tablets to wrap into rolls) from the supply and conveying mechanism as demanded by the system. Thus, from the delivery of production to the finishing of packaging, the system is integrated and coordinated, and the **product itself does the controlling.**

Flow Of Product

To understand the technique of application, let's examine some details of getting the product (1) to the roll wrapping machines, (2) through the wrapping operations, (3) through the main conveyor, and (4) through subsequent packaging – e.g., cartoning and casing.

Start of packaging is where the flow of product (individual tablets) arrives in overhead bucket conveyors from the processing area to the roll wrapping area. There are 15 roll wrapping machines, each having a speed of 170 rolls/min. Since roll wrapping is controlled by operations ahead of it, demand at the roll wrappers is intermittent rather than steady.

Conveyor bucket dumping utilizes a 1-in. air cylinder with a cam attached. A standard 3-way air valve actuates this cylinder, this valve itself being electrically actuated. Since triggering the bucket (to drop tablets to the roll wrapper) must take place in a precise area (correctly located within the center line position above each machine), we had to have a correct length and shape of cam.

How Baffle Works

As each roll wrapper uses up tablets, a baffle measures tablet usage. This works with a counter balance, and if no tablets are being used at a given instant, the counter balance swings free. Then it travels the final arc, actuating a switch, part of the control of roll dropping in accord with demand.

There must be an exact feed to the roll wrapping operation, neither over nor under. A switch, correlated with the overall system works with a vane to indicate a correct number of tablets for wrapping a roll. A Syntron parts feeder equipped with perforated holes functions to eliminate broken tablets and dust. An important point here was developing the correct size of hole.

Roll Wrapping Uses Heat

Roll wrapping takes place according to the standard methods and the machine. However, the Lewis-Howe team added a set of heaters to seal each end of every roll to prevent ends from protruding. This is to prevent jamming of rolls elsewhere during the packaging operation. These heaters are air-cylinder-actuated, electrically controlled from several points. Heat is constant, but when the machine stops, the heaters move to avoid contacting roll ends during a stop.

If only 11, rather than the required 12 tablets are in place for roll wrapping, feelers or fingers sense this condition (because they move a greater distance for 11 than for 12, hence actuate the control) actuating a switch that opens a circuit, sets up a jam relay, and stops the machine.

This in turn energizes the air brake on the equipment to stop the machine and disengage the clutch. It also stops the tablet-dropping action. This provides a holding interval during which an operator can find and clear the jam.

Transfer Of Rolls

Next major action is the transferring of wrapped rolls to the main storage conveyor. This conveyor has 900 flights, each flight holding 30 rolls. Thus, the conveyor provides a maximum storage of 27,000 rolls of Tums. A major feature of the system is to keep every flight filled in order to deliver rolls correctly to the cartoning equipment.

This conveyor is geared to operate from 40 to 100 flights/min. There are 224 ft. of storage on this conveyor. Flights holding the rolls are flocked.

Leaving the roll wrapping equipment, wrapped rolls move across the top of a bridge, making a 180° turn to reach the gate for the dropping action. A set of pins on 1-in. centers spread the rolls in order to drop them. They drop, stopping when caught by the 30 tines of a fork-like arrangement. From here they move to the main storage conveyor.

No Premature Drops

Elements of the control system regulate this action. If no rolls are in place, or if they are improperly positioned, the machinery is regulated to prevent premature dropping. There is protection against jamming; if a roll gets out of alignment, the machine stops.

Sensing comes into play at this point. Sensing takes place just behind the flight of the conveyor that is in position for dropping of rolls to it. Through the control system, the equipment senses the empty flight, releases a clutch control (electrically released and mechanically actuated), thus pushing the rolls off the ends of the tines onto the flight coming along.

Showing the complications of electrical control, we had to elimi-

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PROTECTIVE PACKAGING MATERIALS

nate feedback here in order to let the machine take over and function as it should. There are so many interlocked circuits that difficulty would surely arise if not prevented. So we incorporated a solenoid locking circuit. The mechanical action becomes part of the controlled circuit and thus takes over. Nothing is being controlled during the precise interval of this mechanical action, except that the jam circuits are functioning.

The presence of product (wrapped rolls) on the tines dictates to the circuit. The primary balance (which actuates the dumping of rolls to the conveyor) has electrical actuation and mechanical control. It senses by presence of product whether to drop rolls. The gates cannot open when no rolls are present.

Setting Up Conditions

The product thus sets up electrical and mechanical conditions, although the electrical system dominates the action of control. The conditions must follow a repetitive pattern in order for the system to operate on a production line basis. Any deviation from these conditions results in a jam.

Illustrating application of the general principles noted above in this article, the sensing with the product itself results in storing the information in electrical relays for release in proper sequence or time. Storage of information means storing an electrical impulse, then releasing it. All this is more or less comparable to the magnetic drum type of storage you find in electronic systems.

In developing this system, however, we selected standard, 110-volt components, believing them preferable for the system to those of an electronic system.

Relay Panel Pressurized

We air-pressurized all relay panels in order to keep dirt, foreign particles and the like from coming in contact with controls. A particular problem was the presence of a sugar, large amounts of which go into Lewis-Howe products. When sugar lands on an unprotected relay, it forms a crystalline surface over the contact and in effect insulates it. So, we pressurized the control box with an air input of 1 to 1½ lb./sq. in. and added a felt seal all the way around.

This panel is the heart of the system for each machine. It is the information storage and reaction center. Therefore, it deserves such protection as pressurizing. We find that units thus protected go more than a year without cleaning while unprotected ones need cleaning every month or so. It should be remembered that, because of this control and relay system, the machines can operate without an attendant.

Numerous Variables

It is notable that supplying of wrapped rolls to the conveyor involves many variables: The number of machines running, the number of cartoners operating, or their speeds, for instance. By computation you might find there should be 14 rather than 15 roll wrappers. We found that if we hiked machine speed and conveyor speed, we could run with just 14 units.

The system is geared to put into the conveyor (from the roll wrappers) as many rolls as are taken off at the cartoners. Any difference between what goes in and what comes off represents storage on the conveyor. This is an automatic, intermittent operation. One result of the system has been to put machines on an automatic standby basis with the ability to start or stop as required, and at no extra cost, and have enough flexibility to meet all normal production conditions.

Would A Computer Help?

Many problems arise in connection with the balancing of the line. You may wonder about the use of a computer. This system is developed to operate with a computer, for example, an IBM 705. One problem to solve might be using the computer to determine production requirements as the variables change.

You assume a given rate of production at a maximum speed with a particular number of lines running. This gives you a selection. This element of selectivity is important because it relates to the speed at which the conveyor flights can pass the selection point.

A computer would give you speeds at which to run in order to avoid bleeding off the line. It could happen that improper correlation would mean cartoners were drawing off production faster than the roll wrapping machines could supply it. This would create a gap and eventually cause the shutting down of a cartoner—while the roll wrappers caught up.

Seek Balanced Flow

It is important to remember the underlying purpose of maintaining a balanced flow of production to the cartoners. To illustrate: Assume you are operating a typical factor of 80 per cent efficiency. With this, if your line speed runs at 75 per cent efficiency, you would find that you need to keep 70 flights/min. of the conveyor filled during this interval of movement. You have allotted each one of the 70 to the lines.

Now, suppose you raise your line speeds enough to permit 100 flights/min. to pass through the key interval during the same time interval. This means you have increased your selectivity pattern for the cartoners because (by going from 70 to 100) you have 30 additional flights from which cartoners may take production.

What Is 100 Per Cent?

Confusion over definitions may cause difficulty in understanding the general system used here. For example, there is disagreement as to just what constitutes 100 per cent efficiency. For discussion here, let's look at it this way: Suppose you are having a loss of production, so that, say, three roll wrapping machines are down. As a result, you have to cut your carton-

ing speed. The control system provides automatic adjusting action to such conditions as this.

But you are still operating with 100 per cent of what actually is coming through. In other words, your cartoners are evenly absorbing the output of 12 rather than 15 roll wrappers. From all of this, we might suggest that the term "100 per cent" should refer to the total output of the key machines over a given period. The "100 per cent" comes from adjusting your equipment to operate at 100 per cent of the capacity based on what actually is coming through the plant at a given moment.

Plan For Split Seconds

We found it important to build the machinery capable of far more split-second action than any realistic production might need. Without getting too far into the intricacies of timing, we might cite just one example. This is timing at 80 per cent efficiency. Suppose one flight of the conveyor is required for each 0.0500 min., with 30 rolls/flight at 0.0500 min./flight = 600 rolls/min. This means the conveyor discharge (600 rolls/min. required) chain must be loaded every 0.0500 min. or less.

Discharge timers Nos. 1 and 2 each operates at ¼ sec. or 0.004175 min. (one sec. = 0.0167 min.). This makes the total timer interval = 0.008350 min. (2×0.004175). The estimated time required for all other operations = 0.012000 min. Thus, the total estimated time in minutes is 0.020350 (0.008350 + 0.012000).

Your surplus time available (0.0500 — 0.02035) comes to 0.02965 min. This means the discharge is 59.3 per cent faster ($0.02965 \div 0.05 \times 100$) than the cartoning machinery requirement, or thus is capable of 1470 rolls/min.

Three Types Of Control

Reviewing the elements of control, just a few examples show the use of electrical, pneumatic, and mechanical controls. A quick look at them enhances one's understanding of the system's operation because it reveals the versatility and interplay of controls and actions.

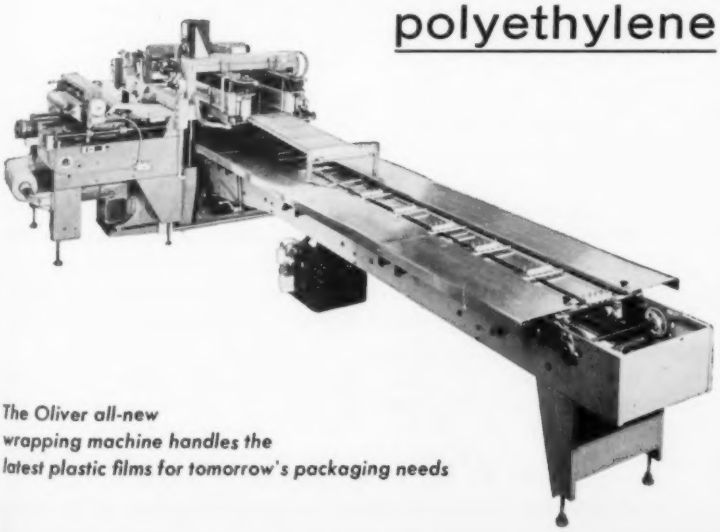
We find electrical actuation, for example, at the opening or locking of the bridge unit where rolls are transferred. The closing of the gates is electrical. You find also a combination of solenoid actions. The linkages are attached directly to electromagnetic coils.

There is pneumatic actuation, for instance, at the point in the roll transferring process, where the gates close down and where the rolls are scraped off to the conveyor. Similarly, the movement of heaters, the clutch on a roll wrapper, the dumping of tablets from a hopper to a bucket — all entail pneumatic action.

Mechanical actuation shows up, for example, on the sensing at the roll wrapper for empty flights on the storage conveyor. Pusher bars, used with roll transfer, illustrate

(Continued on Page 124)

OLIVER announces the all-new variety wrapping machine for handling polyethylene



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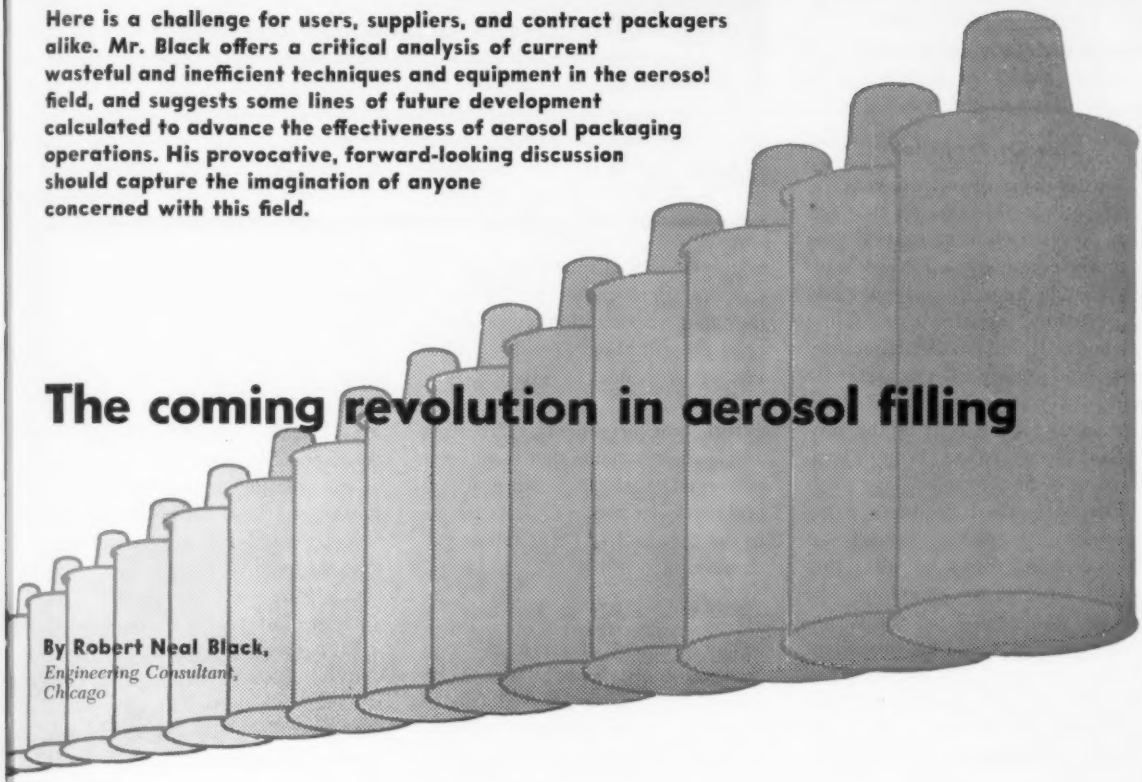
A-55

Here is a challenge for users, suppliers, and contract packagers alike. Mr. Black offers a critical analysis of current wasteful and inefficient techniques and equipment in the aerosol field, and suggests some lines of future development calculated to advance the effectiveness of aerosol packaging operations. His provocative, forward-looking discussion should capture the imagination of anyone concerned with this field.



The coming revolution in aerosol filling

By Robert Neal Black,
Engineering Consultant, Chicago

The wonder child of the packaging industry is the push-button package. This broad grouping includes fine sprays powered by fluorocarbon propellants which are often called "true aerosols"; foam products created by fluorocarbons or hydrocarbons; and finally viscous liquids that are forced from the can by a charge of nitrogen or other non-condensed gas.

"Pressure packaging" is the precise description that might include all of these types, but "aerosol" is the term more often used. This is not exactly correct, but in this business where overnight revolutions are commonplace, it is not too much to expect that the meaning of the word "aerosol" will change to accommodate current usage.

Insecticides, shave creams, hair sprays, and dentrifices are only a few of the areas where the aerosol package came and conquered. There is no need here to review the astonishing sales figures that have marked the doubling and redoubling of the aerosol industry in the past few years.

So much for the package. As indicated in this article, the author submits that the production facilities behind the package have had little of the creative imagination and energy that went into the package itself. A revolution in aerosol packaging is upon us. Prediction of various lines of action to be followed by the industry in making the packaging facilities as modern as the package, seems warranted.

Cold Fill Or Pressure Fill?

Let's begin by heading right into the oldest and thorniest question in aerosol production: Cold vs. pressure filling. When there is a choice, as with most non-water-based products, should the propellant be chilled until it is cold enough to be readily handled as a liquid and then filled into the open can as a liquid? Or, should the can be closed by a valve, and the propellant liquified by pressure and forced through the valve?

Let's take a clear-cut stand on this question. Despite recent widespread acceptance of cold filling, it is unsound, uneconomical, and eventually doomed to oblivion.

This is not to say that, from a quality viewpoint, there is anything wrong with today's aerosol sprays that are cold filled, as most of them are. The point is that new equipment and new concepts of the filling operation are about to give aerosol packagers a workable alternative to cold filling which they have long known to be initially expensive, wasteful in operation, and inflexible.

Why keep on doing it? A manufacturing procedure that chills a large body of material to –20°F., for example, and shortly afterward raises the same material to 130°F., not for a process reaction, but simply to facilitate handling and

testing, has justifiably raised many an engineering eyebrow. Yet this spectacularly cumbersome and wasteful aspect of cold filling is not the heart of the complaint.

Loss Of Propellant

Wastefulness of propellant is the most serious objection to cold filling. A research organization was recently commissioned by a leading custom filler to make a study of existing industry-wide filling methods. It has made laboratory tests and produced an estimate that, on conventional cold-filling equipment, 2 per cent of the propellant charge is lost through flash at point of fill.

For an aerosol producer using annually 10 million pounds of fluorocarbon, losses at this rate would amount to something like $40,000 annually. True, the wasteful vaporization of the propellant can be reduced by holding temperatures of the concentrate and the propellant at their lowest possible level. But some flashing must take place to displace the air in the can. Practically, it seems certain that vaporization at point of open fill will always result in some loss of propellant — often a very serious loss.

Robert N. Black was graduated from Brown University, *magna cum laude*, with degrees in both arts and engineering. Before becoming an independent consultant in packaging and production fields, he was director of engineering at G. Barr & Co. Mr. Black was in the central engineering division of the Colgate Palmolive Co. for seven years, where he was concerned with the planning and installation of aerosol manufacturing facilities. He is a member of Phi Beta Kappa.

Just two arguments. The long and loud arguments that have been presented against pressure filling boil down to two: (1) It traps air in the can, and (2) it is inherently slow.

Eliminate Air In The Can

The problem of air in the can is often more broadly stated by reference to the cold-filled can as the only "quality package." Yet the problem is simply the *quantity* of air in the can, which may cause erratic and sometimes dangerous pressures. Even when extra pressure is permissible, air is widely held to be undesirable because the oxygen or any moisture in the air may become active in the sealed container. This causes degradation of the product or corrosion of the container. There are recent studies running counter to this idea. Whatever the upshot, the prudent packager will want to control the amount of air sealed in its package.

Propellant displaces air. The cold-filling method eliminates air because the propellant at –20°F., for example, acts as a volatile liquid, fuming and displacing the air in the can headspace. Without spelling out any details of work now going on in this or that laboratory, it can be stated that there are many ways of displacing, or withdrawing, air without converting the entire contents of the can into a purging medium.

Method Of Purging

One such method *(1)*, in summary, is where Freon-11 was added to the concentrate and handled not as a propellant, but as part of the concentrate. A small quantity of Freon-12 was then added to this mixture and allowed to volatilize in the container and displace the air. The bulk of the Freon-12 was then loaded by the pressure-fill method. The first objection to meet the eye is that Freon-12, a relatively expensive component, is still rather wastefully used as a purging medium. Other difficulties and unsolved problems are pointed out in the paper cited above.

Despite these shortcomings, this paper is significant as the first public expression of ideas that have

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been fermenting for some time in the industry, notably that the lower-pressure fluorocarbons, such as Freon-11, should be handled as part of the concentrate to reduce the quantity that must be put through the valve in a pressure-fill system.

Gas chromatography. Another significant step toward a more reasonable handling of the problem of air in the aerosol container has been the adaptation and perfection of the gas chromatograph for the analysis of finished aerosol packages *(3)*. Exact laboratory data and not double talk about cold filling and quality fill will arbitrate the conflict between cold- and pressure-fill methods. When the laboratory chromatograph cannot tell the difference between a cold-filled product and the same product that has been pressure filled, then we shall have found an acceptable new purge method.

Pressure Filling Speed

The situation with regard to speed of pressure filling has also been changed by impending equipment developments and by new concepts, mentioned above, of what part of the product must be pressure filled. The "true aerosols" consisting, for example, of 70 per cent fluorocarbons, were long considered hopeless candidates for pressure filling. This was due to the time required to force so much fluorocarbon through the small orifices found in leading valves.

Handle as concentrate. But further analysis of the fluorocarbon content will disclose in a typical case that it is 65 per cent fluorocarbon-11 which can be handled as part of the concentrate, and 35 per cent fluorocarbon-12 which must be forced through the valve. This means that less than one quarter by weight of such a typical product must be forced through the valve, or less than 2 oz. for the popular 7-oz. can.

Wanted: Piston Filler

The remaining problem of forcing even a few ounces of pressurized liquid through an orifice of 0.030 in., for example, is still not an easy matter. The answer is a well-designed, multi-head piston filling machine. At least three competent machinery manufacturers are marketing a machine of this capacity, one in a straight-line arrangement and the other two in rotaries.

A design detail which purchasers of these machines must keep in mind, is the point of seal on the valve and the clearance around this point of seal.

Cutting the waste. Reduction of propellant waste will be one of the big selling points of these pressure fillers, and the inevitable losses at the point of seal will have to be carefully studied in the evaluation of the machine. Whatever the ultimate decision on present designs, it is safe to say that, in time, a fully satisfactory, high-capacity, high-speed pressure filler will become available, as the industry's need is great enough to draw out from somewhere the proper machine.

Under-Valve Filling

Before summarizing conclusions of this discussion on cold vs. pressure filling, some attention must be given to an alternative which is perhaps simply a variation on pressure filling. This is under-valve filling. Pressurized propellant is forced into the can, not through the valve, but under the valve cup. The valve cup is then crimped onto the can as part of the same operation.

This essentially sound procedure has been given considerable attention by a number of leading suppliers and marketers in the aerosol field. However, there was never enough time available, or urgency in the problem, to iron out the many complexities of the operation. It has been returned to from time to time, but concrete results have not yet been seen.

Probable development. Under-valve filling may be the ultimate solution, but a workable, high-speed, high-capacity, through-the-

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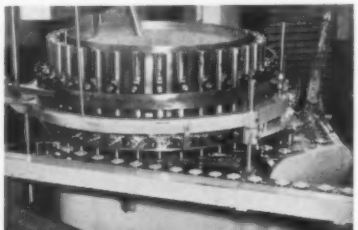

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valve filling system is likely to precede it. However, if a trend toward smaller valve orifices or larger propellant charges should continue, the under-valve design must be pushed to completion.

The Case For Pressure Filling

In summary, methods of pressure filling will lower equipment costs and operation costs. Pressure filling promises the handling of water-based products (such as shave cream), true aerosols (such as hair sprays), and nitrogen-packed products (such as tooth paste) fully automatically, at high speeds, without refrigeration, and interchangeably.

Soon a reality. Current practices in gas chromatography for detecting air in the package, and the development of high-speed, multiple-head gassers, will make pressure filling of all types of products, by large scale producers, a reality in the near future. Not long ago proponents of cold filling proclaimed: "Pressure filling is for the birds." Look out for those early birds with modern, high-speed, pressure fillers. They will get the worms.

Do Away With Water Bath

Next to the filling process itself, the water bath needs most attention. The long, conveyor-filled tanks of barely hot water, used to heat finished cans from well below 0° to 130°F., constitute a slow, messy, sprawling, and generally unsatisfactory operation. Then comes inefficient drying with jets of compressed air, and the threat of exterior can corrosion if the drying is not complete.

Leak detection (by operators watching for bubbles) looks like an operation left over from the last century. Isn't there a fast, compact, and accurate method to bring cans up to testing temperature without wetting them? Immersion in a tank of water offers no advantage in itself except to wash the exteriors of the cans, a detail that could be eliminated by well-designed, drip-proof filling operations. *(Next page)*

Spot leaks automatically. Isn't automatic detection of fluorocarbon leaks by a hot-platinum-filament type leak detector the ultimate replacement for the bubble watchers? Innovations along these lines have been tried many times here and there, but never, as far as is generally known, with enough persistence to overcome initial difficulties. Temperature control is the key problem in high-capacity heating; over-sensitivity the problem with fluorocarbon leak detection.

It is possible that the application problems for this sort of equipment are too special for anyone within the aerosol industry to solve. In that case, we shall have to wait for a determined, well-informed supplier of this type of equipment to step in and follow the problem to its solution. One way or another, the water bath, like the one-horse shay and the gas light, becomes obsolete.

Bottleneck: Valve Handling

It is something of a disgrace to all of us on the technical end of the aerosol filling industry that most of the hundreds of millions of valves now in use on aerosol cans have been placed there by hand. A typical operator picks a number of valves from a hopper or bulk shipping container and holds them like a bunch of dandelions in her left hand. One by one she slips them into the cans as they go by.

There is an old wives' tale that aerosol valves cannot be automatically hopper fed at high speed and that getting the curved stems into the container by a simple machine is nearly impossible. This tradition is about to be hit from several directions and none too soon.

Feeding equipment demanded. Equipment manufacturers are beginning to push harder on the half-completed designs and vaguely worded quotations that, until now, have never materialized into fully automatic, reasonably priced valve feeders. More than one packager, giving up temporarily on the equipment suppliers, has gone after his

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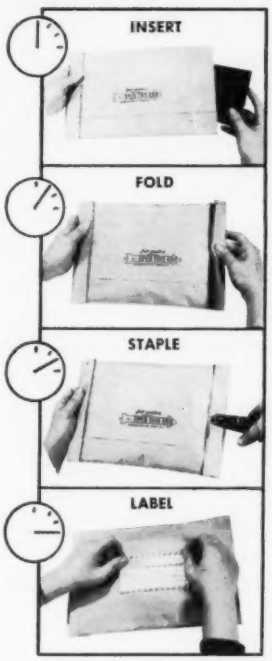

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own machine. Everybody seems to realize that tomorrow's push-button wonders cannot be assembled by the production methods of yesterday.

Problems Of Capping

Placing spouts and overcaps on the containers is a problem that must be seen with less optimism. Here the package designers have the machinery and production engineers on the run. Almost any simple spout or cap could be taken hold of and put through the paces of automation.

But almost no filling line, even among the biggest marketers, is limited to a single package. Each package has a cap of its own characteristic size, shape, and color. (Yes, color is a problem too, as will be testified by anybody who has even tried to hopper white caps in a machine that has previously handled darker colors.)

From time to time comes a cap that must be registered with the can's lithography or label. Compounding the complexities of several packages is the fact that package designers see fit to change each package as often as they can. A fully automatic machine to handle the final capping of any aerosol package on a reasonably economic basis (such as a two-year pay off) is an engineer's dream that has not yet come true except for those fortunate enough to have stable and nearly standard packages.

For the others, there will be continued improvisation in the face of changing requirements — semi-automatic feeds, jigs, etc. For these engineers, there is one compensation: The never-ending challenges from a lively marketing department will keep anybody out of a rut.

Cut Valve Inventories

The growing number of products in aerosol form and the increasing tendency toward tailoring special valves for each product lead to the proposition that the aerosol packager should simplify its valve inventory problem by a limited amount of valve assembly on its own premises. The application of dip tubes and spray buttons alone will reduce inventory considerably, even in the case of the marketer who fills only its own product.

For example, a company producing an insecticide in three sizes probably uses the same valve except for variations in size of dip tube. Rather than stock three valve assemblies, it can stock one valve, tubing, and a machine for cutting and applying the dip tube.

Make it part of filling. When some experience and skill are acquired in this operation, the aerosol filler may simply make it a part of the filling operation. In a similar way, the producer of room deodorants in multiple fragrances, each identified by a different color-spray button, will find considerable advantage if it does not have to stock separate valve assemblies for each fragrance. (Of course, when pressure filling arrives, assembly of the spray button on the valve will *have* to wait until after the filling operation.)

Action along these lines must be taken in cooperation with the valve manufacturers. They, like nearly everybody else in the industry, have been so preoccupied with merely getting out production requirements, that they have found little time for new approaches. But, by and large, they are a progressive and alert group, and, if an advantage to the industry can be demonstrated, they will undoubtedly cooperate.

Recover Lost Propellant?

The most expensive single component going into most aerosol packages is the fluorocarbon propellant. As indicated elsewhere in this article, its efficient handling promises great operational savings. Yet certain losses are inevitable in the atmosphere around the filling line and in packages which do not pass the packager's quality control department. Widespread feeling in the industry is that these losses

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are, in most cases, irrecoverable.

Is this true? Or, can fluorocarbon vapors be economically recovered from the air in the aerosol packager's plant? Can fluorocarbon of reasonable quality be recovered from rejected cans? A method of Freon recovery from aerosol snow has been reported (2). But there is no indication of a procedure for more complex products containing volatile solvents, perfumes, etc.

More research necessary. There is some feeling that we do not yet have the final answer to these questions, and that continued work along these lines may well prove valuable to the entire industry.

Needed Equipment

There is a long list of other equipment that will offer big savings in the next few years just as soon as it gets into production on filling lines. Crimping should be done by multiple-head, rotary machines, but until recently, the only high-capacity examples have been privately built by packagers themselves. Commercial rotary crimpers are now coming into the market. And they look good.

More equipment challenges. Automatic testing of finished cans for pressure and spray pattern or foam quality is a real challenge. Why doesn't one of the can companies come up with a simple device for dumping a bulk can shipper? Isn't there an angle at which the cans will slide out upright, layer by layer, onto a moving belt feeding a rotary unscrambler?

Some Guiding Principles

Having discussed specific changes that will appear in the aerosol industry, let's discuss general principles that should prevail. The first is versatility. It is doubtful if there is a single line producing one type of product that would not be more valuable if it could produce several. The management of a low-fluorocarbon foam line for shave cream will someday wish it could run a high-fluorocarbon true aerosol.

A high-fluorocarbon, cold-fill line producing hair spray today may be wanted for a nitrogen-packed shampoo tomorrow. Even the largest marketer of such products, and who keeps three lines busy full time, will find major cost advantages if it can produce all three products on each of the lines and distribute these lines geographically to reduce shipping costs.

Note that reference here is made to versatility of the line with regard to general product type as defined by propellant composition and quantity. No case is made for such broad diversification that would put insecticides, food or cosmetics, and house paint in the same plant. The case against this sort of mixture speaks for itself.

Packaging line improvement. Other broad principles to look for in aerosol production facilities of the future are the replacement of intermittent, in-line motions with continuous flows of cans in and out of multiple-head (rotary in most cases) machines. Particularly in crimping, pneumatic power will yield to direct mechanical transmission of power for smoother, quieter, and more reliable operation.

Just when this new dawn for the aerosol filling industry will break depends upon how quickly the various technical problems are solved and upon the general condition of the economy. Even a clearly justifiable capital expenditure is hard to sell to any top management when money is tight and the future is somewhat clouded.

Anticipated Results

Results of these changes will have two aspects. The first of these will be private. The organization moving quickly and surely to a flexible, low-cost filling operation will gain competitive advantages. Involved here are details of know-how in the application of the basic ideas discussed above. Nearly every organization has its "bag of tricks" not to be given away.

But the second aspect is public

(Continued on Page 124)

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DU PONT

PACKAGING TRENDS

Data of Interest to Package Engineers from Du Pont

Coating of ALATHON® 16 overcomes delamination

When the Emerson Drug Co. (division of Warner-Lambert Pharmaceutical Co., Inc., Morris Plains, N. J.) developed their new instant sparkling drink, FIZZIES®, they needed a package with many qualities. It had to have point-of-purchase appeal, keep out moisture, be tough and open easily. To develop this package, Emerson turned to the Reynolds Metals Co. Early indications pointed to a foil/polyethylene combination, with a coating of cellulose acetate for additional physical strength.

Emerson subjected packages of this construction to a quality-control test, in which the packs were stored for two weeks at 120°F. The heat seal was not affected, but slight delamination of the polyethylene occurred. More extensive testing was done to find the polyethylene that would withstand these conditions. ALATHON 16 was chosen on the basis of the research.

FIZZIES went to market in this special pouch. Later, transparent 25-pound glassine was substituted for the acetate film for further packaging economies.

It will pay you to investigate how ALATHON may help you. Simply send in the coupon below for more information.

Package opens simply by tearing at a point just above the company name on the printed side of the cardboard.

ALATHON® helps cut packaging costs 25% and increase sales

POLYETHYLENE RESIN

A unique new package using ALATHON polyethylene resin is saving money and stimulating sales for the Burndy Corporation, Norwalk, Conn. Burndy has been packaging their TAPITS® and CRIMPITS®, electrical service drop connectors, by dipping them in molten plastic and embedding a stripping wire in the transparent material. But the package proved difficult to open. It sometimes embrittled in the cold temperatures encountered in air shipment. Occasionally it darkened, destroying the product identification the package afforded. Discoloration due to age and problems from grease on the product further added to the difficulties.

Working with the Chatfield Paper Co. of New Haven, Burndy began experiments with other materials. The results showed that a vacuum package using Du Pont ALATHON was ideal for their use. In the new process, TAPITS are mounted on cardboard with one side printed in two colors and the other coated with ALATHON 16. Then, a sheet of polyethylene is placed over the TAPIT, drawn tightly by a vacuum and sealed to the coating. The CRIMPIT is packaged by placing it on a sheet of ALATHON (supplied by Gering Plastics Div. of Studebaker-Packard Corp., Kenilworth, N. J.) which is perforated to allow the creation of a vacuum. The other sheet is placed on top, the vacuum is drawn, and the two surfaces are heat-sealed.

The new methods of packaging with ALATHON not only have cut costs by 25% and helped boost sales, but the packs are easier to handle. The ALATHON does not embrittle, discolor, nor allow the grease from the products to exude. And shelf life is practically unlimited.

No matter what your problem, one of the family of ALATHON polyethylene resins may help you improve your package and at the same time reduce costs. Find out how by filling in and mailing the coupon below.

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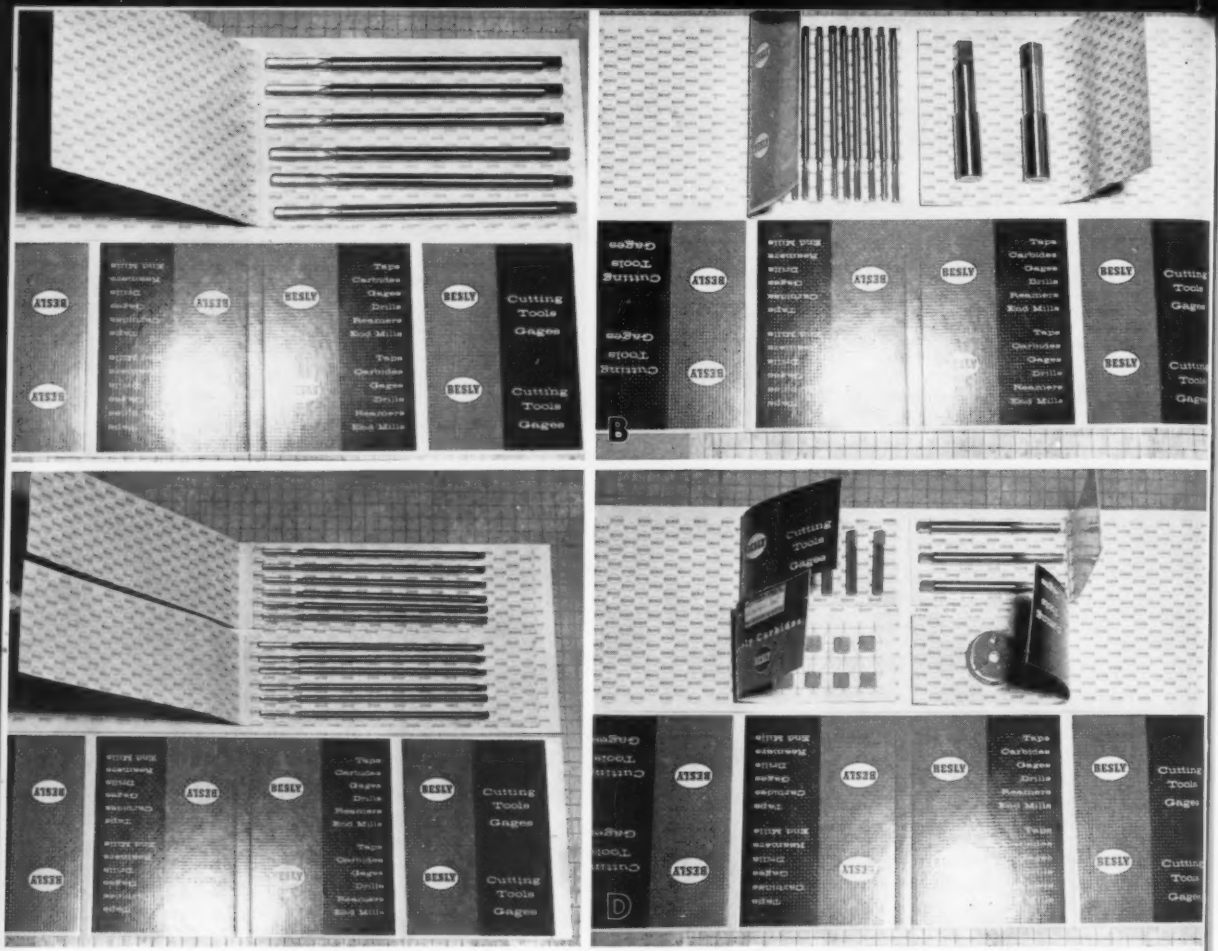

FOLDER CLOSES different ways: (A) center fold for long items, (B) center fold plus split makes two packages from sheet, (C) handling varying-shaped items, (D) four individual packages from one sheet.

High-speed skin packaging for

By Roy W. Hill,
Superintendent of Maintenance, Traffic and Stores, Besly-Welles Corporation, South Beloit, Illinois.

Seeking to develop just the right packaging for a wide range of odd-shaped items including taps, carbide tools, and gages, led us to explore the possibilities of skin packaging and refine its techniques to meet our needs. Besides being small, our products are extremely expensive due to their critical machining and surfaces. Besides, they require packaging convenient for storage, unpackaging, and use-out in the metal-working field.

We faced sharply defined requirements: These packages may remain in user's hands unopened for many months — perhaps years. They must withstand the rigors of transportation and all ranges of temperature extremes before reaching the various destinations at which they face long shelf life. Packages must stay intact to protect our costly products against physical and chemical hazards.

At the same time we sought structural package design versatility and production line efficiency in our packaging area. Applying these concepts to skin packaging thus involved not only getting the optimum paperboard and plastic sheet, but also developing a ther-

moforming operation with a short enough cycling time to turn out completed packages at production speeds we consider realistic. In the main, we are attaining these goals, but we continue to search out new methods and less costly packaging – without loss of production line efficiency or effectiveness of the package.

Folders Are Versatile

Taking first the structural design of our package: Key feature is development of a set of folder-type packages and a design that permits using one sheet as the material for any of nine different package combinations. The basic individual folder when folded once fits into a 3x5-in. card file. Thus, the package lends itself to convenient and intact storage in a standard cabinet. We selected this as the starting point and from it developed our over-all size. As a result, the master sheet not only has enough space for the series of 3x5-in. units, but carries additional space to provide for the folding of the stock.

Inside these folders, the products are skin packaged to the board surface. As a result, we have a uniform exterior package dimension without reference to the shape or number of objects within the package.

One Sheet Equals Nine Packages

We not only can get more individual combinations from one sheet, but also can fold these in different ways – from left, from right, or at center. These and other combinations provide an aggregate of nine individual packages. As the accompany illustrations show, we have positioned the printing on our stock so that there is no loss of copy no matter how we form a package or set of packages out of the master sheet. We have guide lines on the cutter which assist our packers in quickly cutting and forming any desired package.

Another feature is that we can increase production simply by doubling the board size and by not cutting the sheet. This assures us that our basic folder will meet requirements for the foreseeable future.

Making this type of folder package rests on proper choice of component materials. We use a six-ply 24-pt. white sheet which has crossed fibers. We chose it for its ability to fold readily. This board has a vinyl heat seal coating on the inside, is printed two colors on one side and one color on the other. There is a heat resistant lacquer coating on the outside.

(Turn page)

Roy W. Hill attended LaCrosse State College. Prior to joining Besly-Welles as traffic manager in 1943, he was in the variety store management field. Attaining his present superintendency in 1952, he has devoted much of his time to packaging, including the development of equipment and methods geared to the needs of his company's range of products. Mr. Hill has received national recognition of his work in industrial maintenance and industrial painting, as well as in packaging.

ng for long shelf life

LOADING GUIDE aids spotting small items in patterns for packaging. Note arrangements of parts on sheets at right.

PARTS STAY IN PLACE as girl opens and lifts guide from sheet. Frames serve to position many part sizes and shapes.

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Meeting the challenge of skin packaging costly taps, carbide tools, and gauges at production line speeds, with material that withstands shelf life running into years, and with economy of structural design demands not shortcuts, but a systematic solution of one problem after another. Mr. Hill tells how his company attained these objectives and he reveals helpful pointers to effective skin packaging. He stresses the importance of folding a freshly formed package while still hot (to avoid cracking board scores), and he offers useful knacks of loading small parts on boards prior to packaging. Also, he shows how to select correct packaging components.

Board Needs Perforating

This board is perforated. Contrary to assertions that present materials make coated and perforated board unnecessary, we insist on coated, perforated stock. The transportation and storage rigors our packages face plus their unusually long shelf life dictate getting the best possible seal. Our experience with non-perforated stock discloses that in every case we have experienced seal failure.

The only way we can assure ourselves that packages will stand up without failing is to have perforations in the stock in order that our machine may draw the vacuum through the board itself. We are not suggesting that unperforated board would not work with a lightweight or expensive product or where the shelf life protection period is short, but in our case we believe the perforated board is necessary.

We have a certain number of packages that do not require folding. It is a less expensive stock (without the criss-crossed fibers) and is primarily for mounting skin packaged objects flat so that the packaged items on these sheets can go into other containers. However, we can form seven different packages from our basic sheet of this board and can cut it to have different arrangements within packages.

Use Rigid Vinyl

For our skin packaging, we use rigid vinyl for two reasons: (1) it is available in a wide range of different mil thicknesses, and (2) it has the least cycling time of any material we have tried. We use this material in 3-, 5-, 7½-, 10- and 15-mil thicknesses. Also, we use it with the cycling time of 8 sec. Other materials might offer additional advantages, but would require much more cycling time — for example, 28 to 32 sec.

Some 90 per cent of materials currently available for skin packaging do not have the range of thicknesses we require. The higher the object being packaged stands on the board, the greater must be the sheet thickness in order to assure adequate protection at the point of draw and drape. We are now in the process of developing a set of formulas for choosing the thickness necessary for any particular height of item being packaged.

We are currently buying material in 30-in. rolls, but anticipate getting it in sheets in order to avoid the waste of material involved in cutting specified sheet sizes from rolls. This waste arises from our varying material thickness requirements needed for the different and changing runs of product we handle on our skin packaging line.

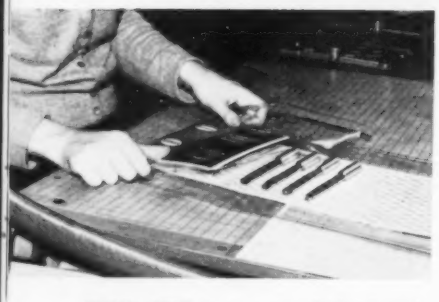
Get Good Seals

Since our tools and other items are packaged with a rust preventive calculated to provide 24 mo. of protection on the part itself, we do not find it necessary to use vol-

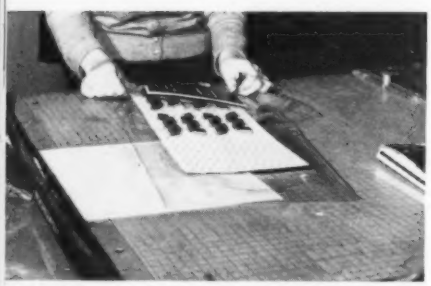
GIRL MANUALLY SPOTS items too long for loading guide. Object: To get these in even, functional pattern prior to skin packaging. Guide speeds up spotting of pieces.

WITH PRODUCT IN PLACE, girl positions sheet of rigid vinyl over board and parts. Height of packaged object governs sheet gauge, assuring protection at draw points.

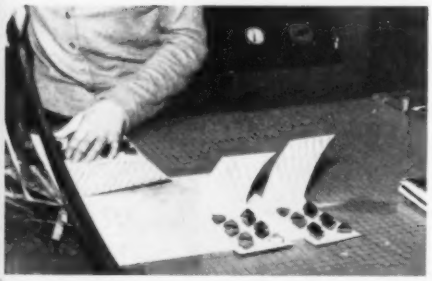
WITH 8-SEC. CYCLING TIME on machine, drape occurs in 3 sec.—material comes out 5 sec. later. Reason for using rigid vinyl: Alternative materials require longer cycling time.



VITAL STEP is to crease folder immediately after taking it from machine. Plastic starts to shrink in place and paperboard is soft and pliable, resulting in neat fold.



FOLDING COLD MATERIAL means cracked top liner and cracked or broken plastic. Folding material hot assures board is stretched sufficiently before cooling off.



USING BOARD SHEAR, girl cuts out surplus material. Note scoring and cutting guides marked on table at right. These speed cutting and trimming, make for accuracy.

atile corrosion inhibitor paper. In addition, we have eliminated the oxygen from the package because the vacuum seal shuts off the entry of oxygen into the evacuated skin package. Further, the packaging protects the item against fingerprints, smudges, and other similar hazards.

Contrary to assertions of many suppliers, we have found that we can run our printing to the edge of the board. We do not need the ¼-in. margin usually suggested as desirable to insure adhesion. With materials we now use, we are getting adequate adhesion all the way to the edge of the board and have experienced no package failure on this account.

Use Own Vacuum Box

To carry out this skin packaging as a production line operation, we installed a Comet unit in our central packaging area. One of the special features we have developed for it is the vacuum box. We wanted to have just one vacuum box – on which we could base one size of board for our skin packaging. As a result, we built this box to convert the machine to our purpose and to provide necessary versatility.

Among its features is a series of 1/16-in. holes, 1 in. apart, arranged in rows in order to facilitate drawing of vacuum. Also, to supplement the main center hole of the vacuum box, we put in four additional holes, two on each side of the main hole. In addition, to provide a flush surface for the work being packaged, we provided a ¼-in. recess below the top. This is to hold the plastic so that when the material goes into place there is the desired flush surface.

Also, we maintain a tape seal between our box and the aluminum plate of the machine in order to assure a perfect seal. Our standard operating practice is to keep the frame open until the objects being packaged go into place on the sheet of board. In this way, we find we can get the frame closer to the work.

Loading Items On Board

To facilitate our loading of items on board sheets, we have developed trays for loading – trays equipped with sliding unloading devices. These are to facilitate transforming objects such as carbide inserts. These parts basically come in eight sizes. Loading patterns include four for triangular- and four for square-shaped items. We can load all of our packages of these by using just two fixtures – by simply reversing the inserts and replacing them in the loading device.

The attendant at our skin packaging machine receives a supply of loaded trays, takes each one, positions it on the racks, opens it so that the parts drop from the loading rack to the board – after which she is ready to start the skin packaging cycle. The loading devices thus not only provide a predetermined uniform pattern of part arrangement on the board, but also speed up the loading operation.

How Operation Works

At the machine itself, the operation is more or less standard. First, the girl loads the fixture, then drops the material in place on the board in the machine, after which she places a blank sheet of skin packaging material on top of the object. Then she actuates both handles of the machine to bring down the equipment, thus drawing the vacuum and sealing the packages.

Cycling time is 8 sec. and we normally operate with 15 in. of vacuum. We operate our heat control at 75 percent of its standard output. Once we bring the oven

into place, we get the drape in 3 sec. and take out the material 5 sec. later, thus making a total of 8 sec.

Fold Package While Hot

Next phase of the operation is one of the most important of our project. As soon as the machine opens, our attendant withdraws the sheet of board holding the skin-packaged items and immediately folds it. Folding the material while it is hot means having the advantage that plastic is starting to shrink in place, and the paperboard is still soft and pliable. Thus, we get no cracking of liner surfaces in the course of folding each sheet 180°. It folds well and the folding stretches the board — and all the while the plastic is shrinking.

If you try folding one of these packages at room temperature, you do have cracking of the top liner and cracking, or complete breaking, of the plastic. But by doing it while the work is hot and pliable, you are stretching the paperboard while the plastic is shrinking. Thus, there is no trouble and, when the paperboard cools down, it is already stretched.

Don't Need Separate Scoring

All this means we do not need a separate unit for scoring the stock after completing the package. Also, it eliminates the labor and equipment otherwise necessary — simply because we do it immediately and as an in-line phase of our skin packaging operation.

Next phase of the work is using a board shear to cut the package along the guide edge. Also at this stage, our attendant cuts out the scrap material in the center of the basic sheet — when separating the individual packages. We have marked our cutter surface with a set of guides so that an attendant can quickly see just how to place each of the various sheets in order to form any particular package. Having these guides greatly speeds up the cutting operation.

Once thus completed, these individual packages go through a

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For more information circle No. 244 on Reader Service Card, Page 117

DOW

Plastiatrics in packaging

DOW'S CLINICAL APPROACH TO HEALTHY PLASTICS APPLICATION

PROPER BALANCE OF IMPACT, ELONGATION AND RIGIDITY KEY TO CLOSURE MATERIAL SELECTION

Injection molded thermoplastic threaded closures have the advantage of additional design flexibility and toughness allowing package engineers and designers to think in terms of improved shapes and decorative effects with a wide range of colors. However, care must be taken in selecting a plastic with properties that match the performance requirements of the closure.

Toughness and rigidity are important strength properties to consider when selecting a thermoplastic material for threaded closures. Plastic closures must have adequate inherent toughness to prevent breakage from the torque encountered when capping a bottle. The amount of toughness needed is dependent upon the size and design of the closure. The relationship between impact values and elongation values in regard to practical toughness is not well defined. The best approach is to compare both impact strength and elongation and choose that material which gives the best combination of both properties.

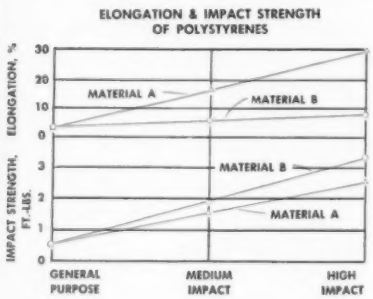

FIG. 1. Impact and elongation values increase from a general purpose polystyrene to a high impact polystyrene. Values for two different polymers are plotted.

As seen in Figure 1, impact and elongation values increase from a general purpose polystyrene to a high impact polystyrene. On the graph, impact and elongation values for two different polymers are plotted. Using only impact values as a guide, polymer B would be the choice rather than A. However, if elongation is considered as well as impact strength for practical toughness, polymer A ordinarily would be better than B. Polymer A's improved elongation would more than offset its slightly lower impact strength.

In addition to toughness, a material must have adequate rigidity. A material could have a very high degree of toughness and yet be so soft that it would override the threads when a torque was applied during the capping operation. Rigidity is a measurement of a polymer's degree of stiffness. As seen in Figure 2, the rigidity of polystyrene decreases as the toughness increases. Thus, when evaluating materials, rigidity must be examined as well as toughness.

In addition to toughness and rigidity, high yield strength also is desirable for most closures. It will raise the stress level at which whitening can occur around threads or the top when high torque is applied. Yield strength also decreases with an increase in toughness (Figure 2) and therefore must be considered in the same manner as rigidity.

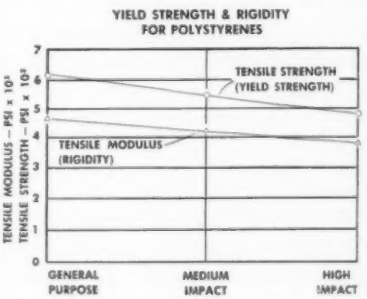

FIG. 2. Rigidity and yield strength decrease with increase in toughness.

Additional points that should be considered before selecting a material for threaded closures are dimensional stability, hardness, chemical resistance, moldability, permeability, odor, taste and toxicity, heat resistance and quality of appearance.

Manufacturers and end users of threaded closures are invited to consult with Dow on the selection of materials for closures.

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pressure-sensitive labeling operation as do other packages emerging from our packaging lines. These labels carry imprinted information – thus permitting one printed sheet to serve a variety of items.

Machinery Maintenance

An important step assuring an effective skin packaging operation is to provide adequate equipment maintenance. Illustrative of the need for it is the fact that the vacuum holes frequently plug up with fuzz from the packaging material. These must be cleaned out. We have reduced such work to a schedule basis – just as we have all other features of our maintenance including packaging, production, and plant facilities.

Another feature of our machine operation is that we have removed all of the heater elements except those covering the vacuum box. Without impairing any packaging effectiveness, this provides a cooler working condition for the operator and uses less electricity than otherwise necessary. This contributes to the economy of our packaging operation.

In spite of the high value of our items, we are able to maintain consistently inexpensive packaging. For example, in one instance we are packaging $600 worth of material for $0.20. Further refinement of our techniques will let us cut these costs still more.

Seek Better Materials

We are not satisfied with existing materials for skin packaging. We urge the laboratories of suppliers and manufacturers to turn out still better material – "better" referring to the particular properties we need. Our special problems are shelf life and temperature variations. For example, packages that encounter exposures from 70° to 0° to 70°F., and which face long periods in transit and in storage, render the packaging vulnerable.

Our experience indicates that most plastics do not hold their shape when exposed to these difficult conditions. Further, much of this packaging is vulnerable to breaking under conditions of cold. We hope these laboratories will develop more material that will provide greater shelf life and withstand the rigors of transporation and extended storage.

At the same time we see many possibilities for extending our use of skin packaging. This sort of operation can make unnecessary having a costly package development program, and we assert that it is comparatively easy to gear an entire package to complete flexibility. This contributes to the ability to buy materials in volume. Further, our standardization efforts for the stacking or arranging of parts on sheets lend themselves to far more versatility than we are presently using. *(End)*

For more information

on the various packaging materials, equipment, and services as offered in the advertisements in this issue, use the reader service card on Page 117.

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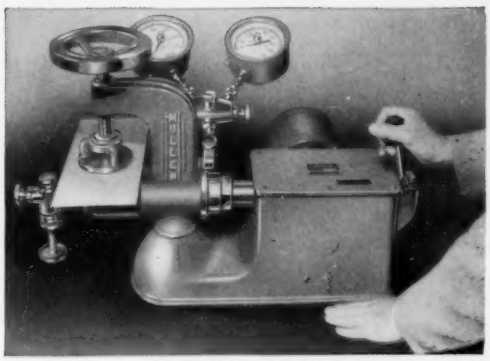

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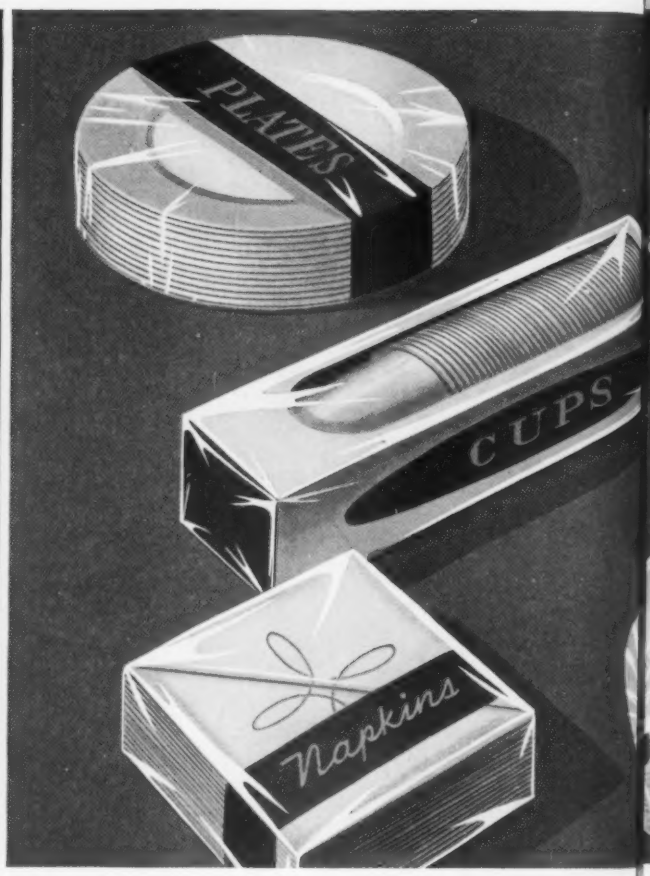

SHOWMANSHIP comes to paper products packaged in new AviSun Olefane! The clarity and sparkle make an appealing, eye-catching "showcase" for your goods. The "feel" is warm, pleasant, inviting. Just the right flexure, too . . . neither limp nor too stiff. What's more, Olefane's showmanship lasts—even after long storage under adverse atmospheric conditions. It is unaffected by changes in humidity—doesn't absorb moisture, change dimensions or become brittle! Yes, AviSun Olefane shows off your products with greater sales appeal . . . keeps them new-looking longer!

AVISUN TECHNICAL SPECIALISTS can answer your specific questions . . . and help you plan for better packaging at lower cost with Olefane film.

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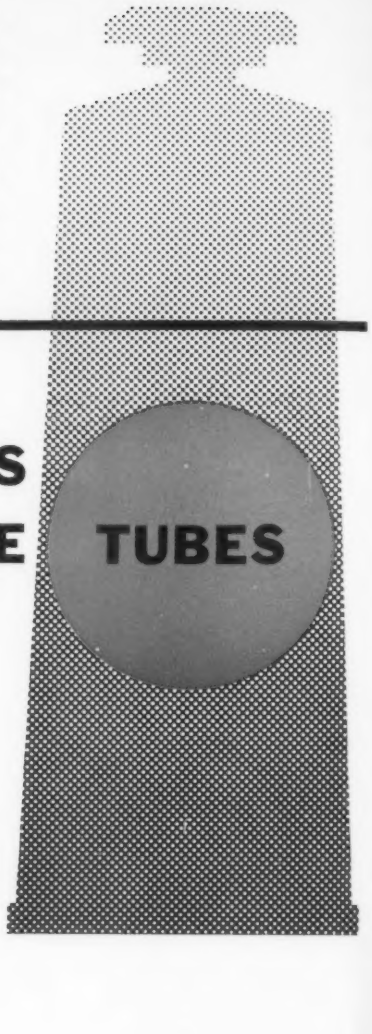
In selecting the proper package for a given product, one must consider all the problems which might be encountered with the product after it is packaged. According to Mr. Dresden, the package is often just as important, if not more so, than the product. Although his article deals primarily with collapsible tubes, many of the principles apply to other types of packages. Discussing tube problems, he points out the importance of adequate, yet practical, tests for choosing the basic package type, the material, and the specifications. He stresses the need of sufficient test time, of setting realistic requirements, and he warns the reader of various hazards in making hasty judgments.



ANTICIPATING PROBLEMS OF COLLAPSIBLE TUBES

By Mark K. Dresden,
Packaging and Management Consultant, Media, Pennsylvania

Problems connected with the selection of the "right" package for a new product, or repackaging for an old one, have been the subject of endless hours of thought, work, and discussion. Establishment of proper specifications for the package chosen is likewise a broad and important field. The package itself is often just as important, if not more so, than the product. While this article deals primarily with collapsible tubes, many of the principles have a more universal application.

The collapsible tube differs from other packages in that it serves as a dispenser, and, in the case of metal tubes, it automatically adjusts its volume to the remaining contents after each use. The largest single end-use is for toothpaste, and it is safe to say that tube packaging was an important factor in the growth of the toothpaste market and the general improvement in dental hygiene. Until the advent of other dispensing packages such as the squeeze bottle and the aerosol, who could imagine toothpaste in anything other than a collapsible tube?

Choose Tube Material

Once a decision has been made to use this type of package, the next step is to determine the material from which it should be made. There are two basic groups here: (1) the conventional metal tubes, and (2) plastic tubes. The two have many similarities, but they are basically different types of packages. *(Turn page)*

1
Check for package/product compatibility

2
Have enough test time

3
Avoid hasty judgments

4
Set realistic requirements

Circle No. 248 on Card, Page 117

U.S.I. POLYETHYLENE NEWS

A series of advertisements for plastics and packaging executives by the makers of PETROTHENE® polyethylene resins

APRIL, 1960 — U. S. Industrial Chemicals Co., Division of National Distillers and Chemical Corporation — 99 Park Ave., N. Y. 16, N. Y.

Packaging Notes

A new polyethylene pouch-in-carton has been adopted by a west coast food concern for packaging frozen fruits in syrup. According to company officials the new container saves 35% over previous packaging costs for lithographed composite fiber-metal containers.

The package consists of a 2.75-mil heat-sealed polyethylene pouch inside a standard lock-tab folding carton with overwrap. The firm reportedly uses a continuous pouch forming-filling-sealing machine which turns out 3,000 pouches per hour.

Retailers are said to like the conventional size and shape of the overwrapped packages. Consumers like the fast, leakproof thawing and ease of opening offered by the new frozen food container. Thawing time for the pouch pack is said to be only 9½ min. in 100°F. water, as compared with 45 min. for conventional fiber containers.

Now, scented polyethylene for packaging, molded items: a new dimension—aroma—has been added to polyethylene packaging films and molded items. Crystal-clear polyethylene films now can be made to create packages that pleasantly affect the senses of both sight and smell. This added sensory dimension is expected to stimulate sales still further for items packaged in polyethylene.

A wide variety of scents have already been developed, including such aromas as "clean linen" for fresh laundry packages, perfume for packaging women's lingerie, sweaters, handkerchiefs, and stockings, and lavender, tweed, cedar, pine, and spruce for men's sport clothing packages. Other aromas such as "cookie", "baked goods", spearmint, chocolate, lemon, orange, and lime will be offered by the manufacturer in the future, pending F.D.A. approval.

The fragrances are sold in the form of polyethylene/scent concentrates, which are dry blended with U.S.I. PETROTHENE film grade resin in making scented film. Between ¼ and 2% of scented polyethylene concentrate is used, depending on the scent. The manufacturer of the scent concentrates claims to be able to scent resins of any density or melt index required by the extruder, and that all aromas become an integral part of the polyethylene film—they cannot be washed away.

U.S.I. Opens Polyethylene Housewares Exhibit

An educational exhibit, designed to show retailers and manufacturers how quality polyethylene housewares are made was recently opened by U.S.I. The exhibit is located in the Housewares Building, 1150 Broadway or 230 Fifth Ave., New York City.

Occupying a space in the building's main lobby, the exhibit tells the story of polyethylene from manufacture of quality resin to production of quality goods through modern molding techniques. The display includes photos of plant facilities and samples of fine molded houseware articles.

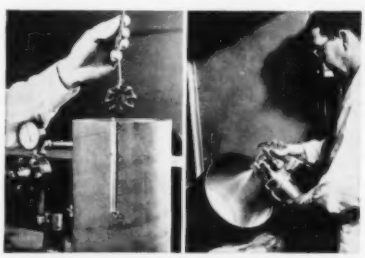
U.S.I. Introduces "MICROTHENE" Finely Divided Polyethylene

Resin in Powder Form Expected to Expand Use of Polyethylene in Textile, Metal and Many Other Fields

Polyethylene in finely divided or powdered form is now being produced by U.S.I. and is available in sample and semi-commercial quantities under the tradename "MICROTHENE". Already in use in Europe, finely divided polyethylene is expected to open many new markets for the resin in this country and to expand a number of existing ones. Some of the applications foreseen include its use in the coating of metal, textile, paper, glass and wood products, as a binder for non-woven fabrics, and as molding powder for production of large polyethylene items such as boats, tanks, and shipping drums.

Methods of Application

In coating operations, MICROTHENE polyethylene can be applied to the substrate in its original powder form, as an organic or aqueous dispersion, or as an organic or aqueous paste. The method selected depends largely on the substrate to be coated, the major requirement being that the substrate be able to withstand the heat necessary to fuse the resin into a continuous coating. In the coating of woven and non-woven fabrics, dry polyethylene powder or a paste is generally spread evenly onto a moving web, which then passes through an oven to sinter the plastic into a film coating. Metal parts can be coated by spraying, dipping, or slush coating with either the dry powder or dispersions. Organic dispersions are generally used on metals that would be corroded by water. With modifications of application techniques, strippable polyethylene metal coatings may be possible.



Two methods for coating metal with MICROTHENE finely divided polyethylene are shown above. Hot object is dipped in fluidized bed of powdered resin, left. Resin dispersed in organic liquid is applied by ordinary spray equipment, right.

Fluidized Bed Technique

Irregularly shaped objects, wire, and other metal items can also be coated with inexpensive equipment employing the fluidized bed technique. The item is first preheated, dipped into a container with the fluidized dry powder, and then cooled or post-heated to achieve a smooth, continuous coating.

Plastic Moldings

Another potential market for MICROTHENE finely divided polyethylene is in the field of large plastic moldings. The powder is poured into heated molds which shape the polyethylene as it melts on the surface of the mold. Excess powder is then poured out. The molds required are extremely simple and inexpensive. Large containers, drums, and even small boats have been made successfully by this technique in Europe.

Two MICROTHENE Resin Types Available

U.S.I. is initially marketing two types of MICROTHENE polyethylene. One type will be similar to PETROTHENE 202 resin (melt index 22, density 0.916); the other type will be similar to PETROTHENE 206 resin (melt index 5, density 0.924). As new market requirements develop, other types of resins will be made available in finely divided form by U.S.I.

Each of the above resins is available in two forms: fine (smaller than 200 mesh) which is made by a solution process; and coarse (50 to 100 mesh) which is made by a mechanical grinding method. Both types of powder will have their own fields of application.

Production Facilities

U.S.I. is now producing MICROTHENE polyethylene at Tuscola, Illinois, site of one of U.S.I.'s two polyethylene plants. The plant, which went on stream in March, has an initial capacity of 2 million pounds per year and is designed for fairly rapid expansion.

Samples of MICROTHENE finely divided polyethylene, and a Technical Data Sheet giving detailed product information may be obtained by writing U. S. Industrial Chemicals Co.

U.S.I. Announces Booklet On Polyethylene Printing

"Printing of Polyethylene" is the title of a new U.S.I. booklet just off the press. It's the latest addition to special U.S.I. literature designed to help achieve finest results with polyethylene packaging film.

The new booklet discusses methods of film treatment, printing techniques, printing inks, and field test procedures. It also contains a glossary of commonly-used ink and printing terms.

A copy of this valuable 16-page booklet is available upon request. Just write to U. S. Industrial Chemicals Co., 99 Park Ave., New York 16, New York.

A message to

Package research and development departments

Engineering departments

Technical and research libraries

Everyone concerned with what is being written in the world of packages

Last month, we announced that we had been appointed American agents for *Packaging Abstracts*, published by the British research association PATRA—The Printing, Packaging & Allied Trades Research Association. This service gives you, in a single, handy periodical (published monthly, plus an annual index), brief summaries of packaging articles that have appeared in some 200 packaging magazines plus over 150 magazines devoted to printing and allied subjects, and numerous patents, books, pamphlets, and technical data provided by makers of machinery and materials.

This publication is unlike any other abstracting service in the world. It covers the entire range of the packaging field; it abstracts not only English language periodicals, but translates and abstracts foreign language publications from Germany, Russia, France, and every country in the world that publishes periodicals concerned in whole, or in part, with the various phases of packaging.

At present, each issue is divided into 18 main sections, including among others such subjects as packaging materials, adhesives, labels, coatings, and packaging machinery.

How To Use *Packaging Abstracts*

Suppose you are interested in finding out what has been written on cushioning. You would refer to the section on cushioning. A recent issue abstracted seven articles on the subject, that had appeared in one American magazine, two British, one Canadian, and two U.S. military reports. Perhaps the abstract would give you the information you want; if not, you could request a complete reprint or copy of the original publication. The same issue, for instance, abstracted 13 articles on plastic containers. An average issue carries about 400 abstracts based on literature received from all parts of the world.

The Cost Is Nominal

It costs thousands of dollars to collect, translate where necessary, evaluate, and abstract pertinent articles. Each month, literally thousands of pages of editorial material are read and the final result put into a handy 5½x8½-in. booklet averaging around 100 pages a month, plus the annual index. You can receive the 12 monthly issues plus the annual index for a total annual subscription price of only $42.00.

Examine It 10 Days Free

Just mail the sample subscription form shown and we will mail you a sample copy of the January 1960 issue. You may return it in 10 days and you owe us nothing. If you keep it, we will mail you the February issue and subsequent issues as they come off the press, and bill you $42.00 for a one-year subscription.

Free Examination Form

PACKAGE ENGINEERING
185 N. Wabash Avenue
Chicago 1, Illinois

Gentlemen:

Please send me a copy of *Packaging Abstracts* for 10 days' free examination. I understand that I may return the copy in 10 days and I owe you nothing. If I do not return it, you may bill me $42.00 for a year's subscription.

Name _____ Title _____

Company _____

Street Address _____

City _____ Zone ___ State _____

The metal tube is truly collapsible, whereas the plastic tube is simply very flexible. It can be squeezed to extrude the contents as with a metal tube, but unlike the metal tube, it tends to return to its original shape. The metal tube stays collapsed, and if the user rolls it up, as he should, it adjusts its size to what is left in the tube. If it is just squeezed haphazardly, it still reduces itself in capacity, but becomes rather messy looking.

Pro's, Con's Of Plastics

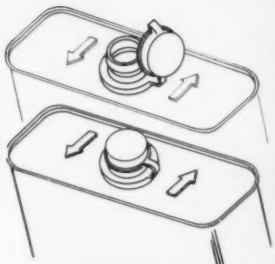
The plastic tube, on the other hand, because it returns to its original shape after squeezing, retains a much better appearance throughout the period of use. This characteristic is important, too, because it means that less damage is likely to occur in shipping and handling than is the case with metal tubes.

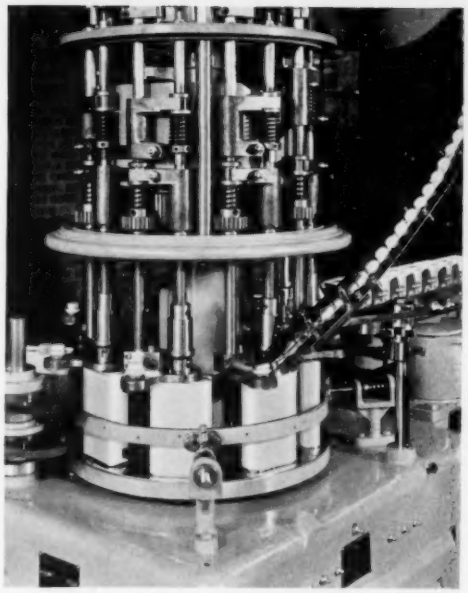
Plastic tubes may be safely dumped in a supermarket bin, without too many problems, whereas metal tubes require added protection such as individual cartons or blister packaging. The plastic tube has the disadvantage of permitting air to replace the product as it is used, and considerable manipulation is necessary to extrude the contents as the user gets down to the end of the supply. There are thus several functional considerations which should be evaluated in arriving at the decision of metal versus plastic tubes.

Can It Hold Product?

The tube's physical ability to hold the product without deterioration is also an important consideration. With plastic tubes, such things as water-vapor transfer, compatibility with essential oils, environmental stress-cracking, and many others require consideration in addition to compatibility with the product itself — the chief factor with metal tubes. This is where the packaging laboratory should start its work.

Experience will be a good guide in eliminating materials that won't

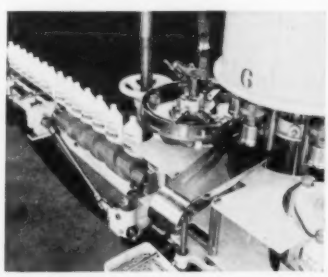




HERE'S BEST WAY TO APPLY THE NEW PLASTIC "FLIP CAPS"

Plastic "Flip Caps" give the new 1960 look to both "F" and "I" type cans. Consolidated has perfected the dependable, fully automatic method for applying these new plastic closures which replace the soldered screw-neck nozzles which have been in use for over 25 years.

The new D8-FS Consolidated Capper is available in models with 2 to 8 spindles and with capacities from 40 to 250 containers per minute. The plastic fitments with *captive plastic caps* are fed from a hopper and inserted by straight down pressure rather than rotary screw motion previously used on metal screw caps. Caps are oriented with hinge strap parallel to length of can. Cost-consuming soldering is eliminated by the neckless can — your packages are up-dated for increased consumer appeal. Consumers prefer this type cap because of convenience of handling. Both quart and pint sizes can be handled with equal ease.



Consolidated D6-F Capper in use at S. C. Johnson & Co. applying plastic screw-type closures with captive caps to plastic containers. The new design, adjustable tension grips hold plastic containers firmly without collapsing them. Capacity 120 containers per minute.

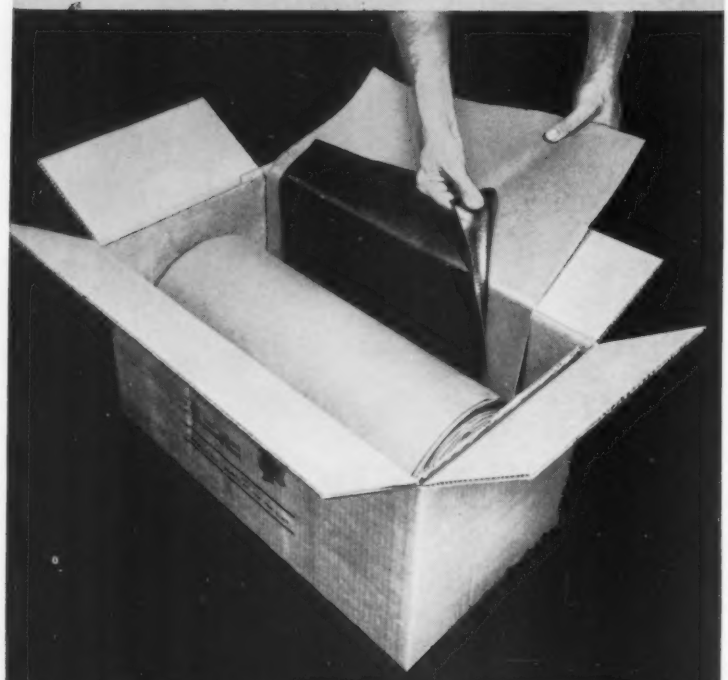
For complete information about this most modern equipment for applying these most modern caps, write today.

CONSOLIDATED PACKAGING MACHINERY CORP.

A Subsidiary of International Paper Company

1400 West Avenue, Buffalo 13, N. Y.

2 useful services...



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1. To separate calendered rubber from itself and its package, Vulcanized Rubber and Plastics Company, Morrisville, Pa., chose Patapar Releasing Parchment. Handling and shipping has been economically eased for Vulcanized. Storage and preparation is eased for the company's customers.

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Perhaps Patapar Releasing Parchment can make *your* production process more efficient. Send for free sample and information kit.

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work, and in selecting those that have promise. In any case, it is essential to package a generous sample of the actual product in tubes made of all the materials being considered, and then to subject them to various tests.

You should duplicate as closely as possible all of the conditions likely to be encountered in actual use. Extremes of temperature and humidity are important to consider, and it is highly important to allow sufficient time to establish a shelf life that may reasonably be expected – plus some margin of safety.

Some Facts Of Shelf Life

World War II presented an unusual opportunity to get specific data on shelf life: The tube-for-tube exchange requirement instituted by the government in order to salvage tin. Prior to the war, most tubes, especially for products used on or about the human body, such as toothpaste, shaving cream, pharmaceuticals, and the like, were made of tin.

Even before Pearl Harbor, the tube industry was required to substitute lead for tin except for a small percentage of important pharmaecutical products that just couldn't be packaged any other way. All tubes had identifying code marks so that the operators separating the various metals at the Tin Salvage Institute could identify each metal with minimum difficulty.

Find Tubes Last Longer

The percentage of tin tubes salvaged approximated that of tin tubes produced prior to restrictions, for an extraordinarily long period of time. Even after two years, it was quite high. This experience lends strong support to the theory that the life of a tube package, even for such a fast-moving item as toothpaste, is considerably longer than might be expected.

Incidentally, it is interesting to point out that the metal tube industry actually helped to salvage

Mark K. Dresden received his B.A. degree from the University of Pennsylvania, and is also an alumnus of Swarthmore College. He joined A. H. Wirz, Inc. in 1934 and was associated with the company for about 25 years, the last five of which he was president. Mr. Dresden left Wirz to become an independent consultant. His experience includes considerable accounting and financial activity as well as management and sales. Prior to joining Wirz, he was with Scott Paper Company. His association activities include Packaging Institute and Collapsible Tube Manufacturers Association.

considerably more tin, during the war-time period, than it consumed. It is understood that a net profit of about $1,000,000 was turned over to the RFC as a result of this operation.

Enough Test Time Vital

During this package testing stage, there is just no substitute for allowing sufficient time for the tests. You can devise accelerated tests to show up certain conditions in a short period of time, but to be reasonably safe, you should have the satisfaction of actually observing that the material will stand up safely for a period of time approximating normal shelf life.

In many cases, an internal protective lining of the tube will be considered. The testing procedure would be pretty much the same as suggested above except that one important additional step should be taken: the tube should be flexed, or kneaded several times during the storage period. This simulates a condition found in use, and it permits an evaluation of the flexibility and adhesion of the lining to the tube surface.

Avoid Hasty Judgments

Some years ago, considerable difficulty arose and a lot of money was lost, because this precaution was not taken. A certain product seemed to stand up quite well in a lined tube, but had a bad reaction with the bare metal. On the basis of storage tests of the product in lined tubes, which were quite comprehensive, but did not include flexing, the decision was made to proceed with the marketing of the product.

The particular lining did not have sufficient flexibility and adhesion to resist the slight denting that occurs during shipment and handling in a store, or the severe flexing that occurs in actually using the tube. The lining broke down, permitting the product to come in contact with the tube metal itself, and a reaction set in which caused severe pinholing. No end of trouble resulted, which this extra evaluation and check could have avoided.

Keep Control Samples

In conducting the storage test, it is always advisable to keep some of the product packed in glass, as a control sample. In evaluating the results, product from the tubes on test should be carefully compared to the control sample for color, texture, odor and flavor (if a factor), general appearance, etc.

Cut open the tube, preferably longitudinally, then carefully remove the product and examine the interior surfaces of the tube for any evidence of chemical reaction. The air line at the crimped end of the tube is often an especially vulnerable spot and demands close observation.

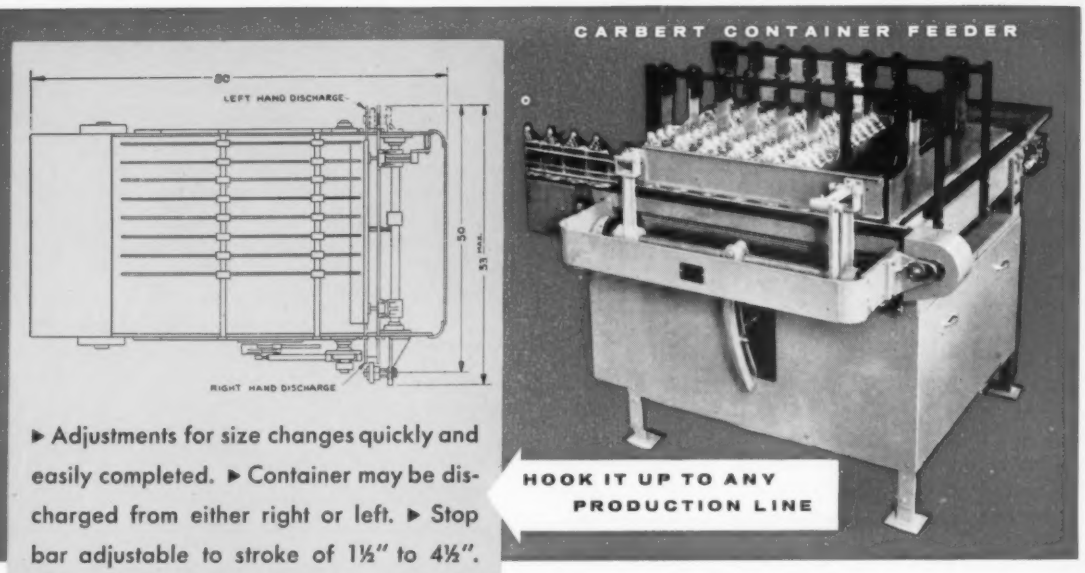
The cap, and the cap liner, if one is used, require careful scrutiny, and you should note any evidence of difficulty. Negative results frequently show up quickly, but again, we must emphasize that time is most important in arriving at positive conclusions.

Products in a tube package do not ordinarily seem perishable to the public, as for instance meat or produce. Thus, an absolute minimum of six months' safe storage becomes essential, with a period of one or two years quite desirable.

(Turn page)

LINES THEM UP FOR ORDERLY FEEDING

low cost unit simplifies "unscrambling"



▸ Adjustments for size changes quickly and easily completed. ▸ Container may be discharged from either right or left. ▸ Stop bar adjustable to stroke of 1½" to 4½". ▸ Simple, rugged construction and minimum maintenance. ▸ Speeds, up to 30 cycles per minute.

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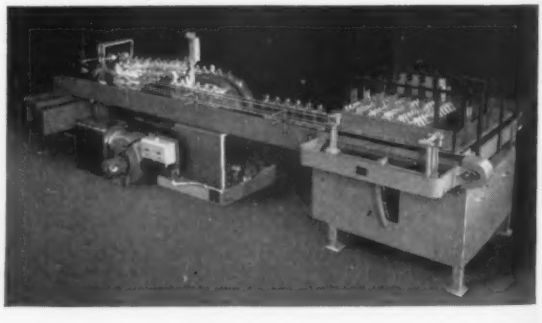
FOR LARGE VOLUME PRODUCERS

There's been a big and growing need for this relatively small, low cost unit. Hooked onto any production line it "organizes" the containers and gently regiments them into the proper single line groups for fast, smooth feeding to the next operation.

Get all the facts. Send for bulletin 143.



★PNEUMATIC

Packaging and Bottling Equipment

Keep On Making Tests

Once you complete your storage tests, you can tabulate the eligible materials and then make your choice between them on the basis of costs, appearance, weight, and other appropriate factors. Even so, a resourceful packaging man wisely keeps up continuing tests, trying new materials, linings, and other combinations, so that, should other conditions change, such as cost relationships, he is able to make good recommendations.

This business of actual storage testing undoubtedly applies to almost every package form, whether it be a tube made of metal or plastic, a can, a bottle, or a box. It is a wise package manufacturer who insists on such testing.

The danger of not doing so is illustrated by a case of a company which had a fine new product, and wished to package it in a metal collapsible tube. After listening to the relative merits of the various metals available, the developers of the product felt that aluminum was ideal for them.

Check On Compatibility

Then a question of compatibility came up. They said that they were completely satisfied as a result of tests which they had made themselves. So they went ahead and bought a substantial quantity of aluminum tubes, and proceeded with the marketing of their product. It seemed to find very good initial acceptance and everything looked just fine.

But one day, about two or three months later, they began to notice that their tubes were swelling up. Their first thought was that there was something physically wrong with the tubes, since their tests had indicated that the product stood up quite well in aluminum.

Not The Right Tests

Upon examining some of these magically swelled-up tubes, it quickly became quite obvious that there was a reaction going on between the aluminum and the prod-

end sticking

reduce down time

with **TEMP-R-TAPE®**

Temp-R-Tape eliminates sticking problems and undesirable accumulations. No materials, even those of a sticky, or viscous nature will adhere fast to its slick, wax-like TEFLON surface. Pressure-sensitive . . . it's easy to apply . . . easy to remove . . . reduces the down time involved in sprayed or baked-on Teflon surfacing. Temp-R-Tape has a useful temperature range of −100°F to 500°F. It's odorless, non-contaminating, non-absorbing and durable.

NON-STICK USES: heat sealing bars; forming plates, dies and bars; labelling rollers; chutes; hoppers; gussets; fins; guide rails.

AVAILABLE FROM STOCK: ¼" to 2" widths, 18 yd. and 36 yd. rolls and 12" widths on liner by lineal yd. Special roll widths slit to order. Sold through distributors.

FREE SAMPLE and folder — write, phone or use inquiry service.

ELECTRICAL AND INDUSTRIAL SPECIALTY TAPES

CHR **CONNECTICUT HARD RUBBER CO.**

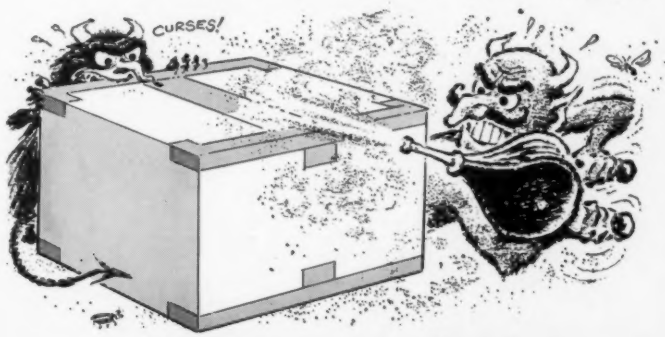
*duPont TM

Main office: New Haven 9, Connecticut

For more information circle No. 253 on Reader Service Card, Page 117

Only gummed tape is—

DUST, DIRT, VERMIN-PROOF!



only tape gives you really safe closures!

DARLING'S Improved BONE GLUE

DARLING & COMPANY

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Suppliers of Animal Bone Glue to Gummed Tape Manufacturers

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PROVIDES "*complete*" SUPPORT, SUSPENSION, AND SHOCK ABSORPTION FOR YOUR PRODUCT

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IS AVAILABLE IN STANDARD MULTIPLE SLOTTED SIZES OR MADE TO YOUR SPECIFICATIONS

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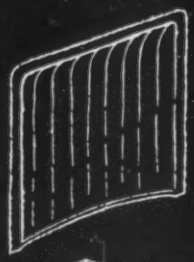
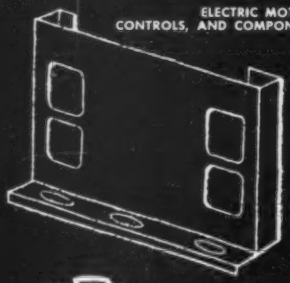


GLASSWARE, SHELVES, FIXTURES, SPECIALTY ITEMS

ELECTRIC MOTORS, CONTROLS, AND COMPONENTS

RADIOS, TELEVISION, AND APPLIANCES



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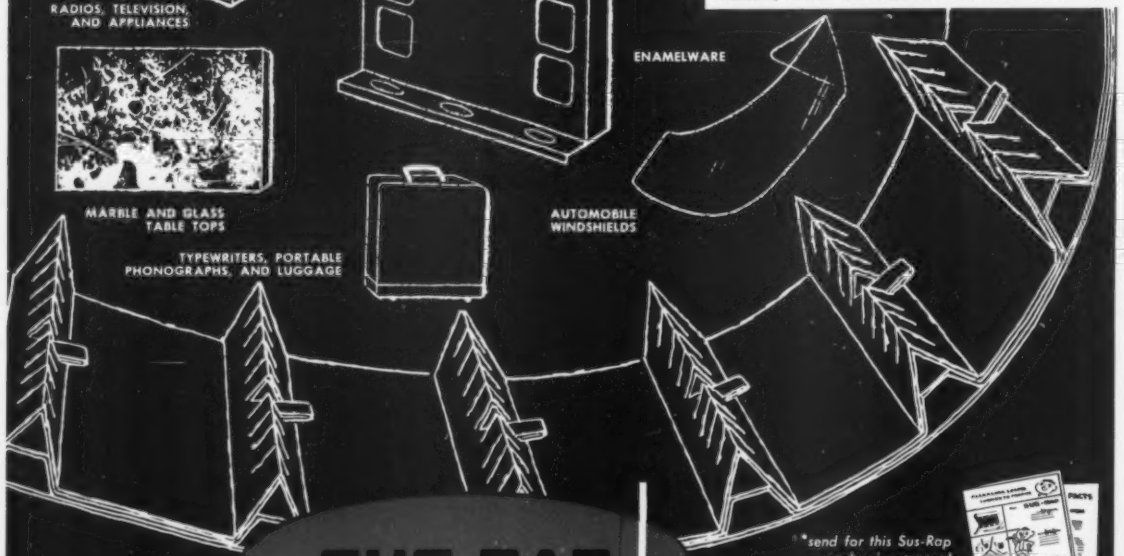
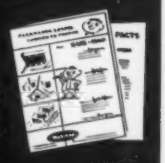


SUS-RAP

*send for this Sus-Rap packaging manual and Packaging Facts . . . today!



VANANT COMPANY, INC.
955 S. Water St., Milwaukee 4, Wisconsin

Laboratory Developed and Tested Packaging

uct, which formed gas inside the tube. When someone removed the cap, the product shot out through the opening as if fired from a squirt gun or an aerosol package. Some of the crimps had also begun to open up as a result of the pressure build-up.

A little probing revealed that the tests upon which this packaging decision had been made consisted solely of placing a piece of aluminum foil in a jar of the product and noting after a month or two that nothing seemed to be wrong with the foil. The reaction was of an overall nature, so that no pitting or corrosion marks were evident, but reaction there was—and in addition, quite a number of red faces and a depleted treasury.

They made a hasty substitution of lead tubes, but this new product, with such a bright future, was almost irretrievably ruined because of faulty packaging. Lesson? **Be sure that the actual product in the actual package has had sufficient testing so that you know it will be safe.**

Don't Be Too Cautious

Still on the subject of the basic raw material, we must emphasize that overcautiousness can also be foolish. The packaging engineer will be tempted to insist upon the package that he knows will be the safest, but cost and other considerations should also be taken into account. The goal should be a package that is completely adequate, but not necessarily perfect. The difference between the two can sometimes be substantial. **If there are some doubts about a particular material, go cautiously, but don't rule it out.**

There is at least one case history of a well-known product where this procedure was followed. For a number of reasons, its producers thought it desirable to package this product in unlined aluminum tubes. Tests showed that there was some tendency for pitting to occur, and there was a considerable amount of good evidence to show that it was caused by contamination inside the tube, especially of tin or lead. For example, it turned out that tubes which had been produced on the same equipment used for tin or lead tubes, picked up contamination, which in turn caused the pinholing.

Why Not Try It?

The first impulse might have been to reject this particular material, but instead, they went ahead with its use, very cautiously, and took extreme precautions to see to it that the tubes would be manufactured under conditions which would eliminate all possible contamination.

As experience accumulated, it developed that, whenever pinholing occurred, the products from the corrosive action itself formed a hard "barnacle" over the pinhole, so that, in effect, the reaction itself produced the necessary protection against the package becoming unserviceable.

The barnacle was such that it

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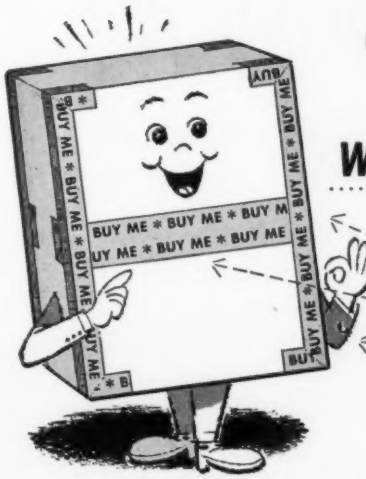
Circle No. 256 on Card, Page 117



Only gummed tape
SELLS
WHILE IT SEALS!

printed tapes identify and promote your package

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attached itself rather firmly to the tube wall and there was little likelihood of its being extruded out of the tube with the product. Further study established that the reaction could result from a great number of things other than contamination from particles of tin or lead.

When It Pays To Go Ahead

As further experienced a knowledge of what, and why it, happened developed, it was possible to reduce some of the precautionary measures and to proceed on a larger scale. So far as is known, there hasn't been one consumer complaint or one case of a reported package failure.

This illustrates how important it is to be careful, and, at the same time, be imaginative and daring in arriving at a sound packaging decision. **If there is a choice to be made, lean on the side of being safe, but don't rule out alternatives until they have been completely explored.**

Perhaps the *real* point of this discussion on the wisest selection of the package material is to urge the avoiding of "crash" decisions wherever possible. The good packaging man will be ready, with facts, tests, and experience, when he is called in to help decide about proceeding with a new packaging project.

This obviously requires very close cooperation and good channels of communication between the various divisions of a company as new or changed products are developing, marketing plans are crystalizing, and purchasing policies are reaching formulation. The large, integrated companies usually have all of the specialized services and sources of information that may be necessary, and their problem is typically one of communications among people with various responsibilities.

Where To Get Help

Smaller companies have a more serious problem, since they often do not have the depth to go through all the steps that are desirable. There are a few things, however, that they can do to achieve the same results as larger concerns. Among these are to know *when* to call in expert advice from the outside, and to get *all* the help they can from their suppliers.

A great deal of information and assistance is readily available from such sources, but it is most important that the suppliers' receive *all* the facts so that they can render intelligent service. Many package suppliers maintain their own package testing laboratories, with personnel who are experienced in evaluating their particular types of packages.

Another thing users can do is to establish as much of a practical testing program of their own as they possibly can, and to be sure that they **don't jump to conclusions and make crash decisions not based on reasonable facts.**

After making the basic decisions as to the type of package and the

wrap-ade HIGH SPEED UNIT PACKAGER

TABLETS- up to 800/MINUTE

Model UPH

The Unit Tablet Packager operates at speeds up to 800 tablets per minute on four row machines. Interchangeable feed tracks are available to accomodate different size tablets.

Typical Fin Seal Package

FEATURES:
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- Printer for coding
- Easily opened package — tear notches optional
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material from which it is to be made, the next problem is to establish the desired physical requirements and other features such as lithography,* colors, etc. Here again, collapsible tubes present some specialized problems which are not present with other packages.

Establish Tube Size

The size of the tube itself is not the easiest thing in the world to determine. Usually, requirements call for packing a given quantity of a product in the tube, and the problem then is to establish the correct size to hold it. Because of the fact that it is collapsible, and that it changes shape and capacity upon being crimped, this is an inexact science.

Trial is thus important, and the best procedure is to take some of the actual product on the actual machine which will be used for filling, and try it out. Product consistency, type of crimp, type of filling mechanism, whether or not the product will "tail," are some of the factors requiring consideration.

Fortunately, tubes are very versatile packages, and, while diameters, openings, dimensional tolerances, etc., have been standarized, their capacities can be altered quite considerably by variations in length of the tube wall. Within very broad limits, you can easily obtain any length desired.

Cooperate On Details

There are a number of other characteristics which deserve brief mention. The type of lithography, whether it is to be permanent or removable as with pharmaceutical products; the type and style of cap; liner specifications; thread specifications, especially if separate applicators are to be used; opening; packing; etc., are all things which must be established before production can begin.

This is the point where close cooperation between the production people and the quality control people for both buyer and seller should begin. It can pay big dividends in the long run by eliminating misunderstandings, and by producing better quality and, most important, lower costs. It is a wise purchasing agent who sees to it that quality standards are established on a realistic basis, and insists on strict adherence to these.

Controlling Quality

Most quality characteristics can best be valuated during manufacture, with due regard for the processes in use. As a simple example, in the case of a metal collapsible tube, a diameter specification and tolerance are quite important. If the tubes are not within the proper diameter tolerance, the user will encounter difficulty on its filling machinery.

There are just two important things that affect the diameter of a tube when it is being produced: (1) the starting die size, and (2) die wear. If the die is of the correct size when it goes into production (you need measure only one tube produced from it to determine this), there is nothing much that can happen to the diameter except a very gradual increase caused by die wear from a substantial amount of production.

In order for the user to be assured of receiving tubes of correct diameter, it need only require a careful check whenever a die is put into production, and then ask for a check every day or so to see that the die has not worn out of tolerance.

More Involved Testing

On the other hand, in the case of an internal coating, the problem is somewhat more complicated. In the first place, any void in the coating may well be the cause of an unusable package reaching the consumer; in the second place, there are various unrelated things that can cause voids or failures. Thus, for this characteristic, much

*Editor's Note: Mr. Dresden provides helpful pointers for users, about printing on collapsible tubes, in his article, "Printing of collapsible tubes," PACKAGE ENGINEERING, 3 (1958), No. 7 (July), p. 19.

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OLIN MATHIESON
Packaging Division
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more elaborate testing procedures becomes necessary.

A visual test helps, but is by no means enough, since the inside of a tube is hard to see, and many failures are quite small. However, with a visual test, glaring failures will show up. To make this testing more effective, use a spotlight which can be aimed towards the inside of the tubes after they are packed, open-end-up, in the boxes.

A chemical test is usually desirable to show how really effective the lining is. By using a reagent which quickly produces a reaction with any bare metal, you can easily observe voids. A more stringent test involves using the reagent plus an electric current which will often show up not only voids, but too thin a coating on the surface.

Set Realistic Requirements

Unfortunately, until someone conceives of a better method, a chemical test is destructive, time-consuming, and expensive. For this reason, you usually must compromise between perfection and a reasonable quality assurance. Use of statistical sampling techniques is highly desirable and provides a good method of evaluation.

It is very important that there is a clear understanding and agreement between the supplier and the user, as to the exact test to be used and the sampling plan to be followed. It is foolish to demand absolute perfection, since this probably can never be achieved. The practical way is to agree upon limits, and to see to it that these limits are maintained.

The buyer who insists that he will not accept any defects is inviting evasion, excuses, and subterfuges. When the issue is squarely faced, and the problems recognized, he will be getting facts, cooperation, and probably real improvements.

In this connection, the point worth stressing is that industry can save an enormous amount of time, effort, and money if it would generally recognize that the primary responsibility for quality control lies with the manufacturer, in this case the packaging supplier, with the understanding that proper reports be furnished to the user as to tests made, results found, and techniques used. The user should have the privilege of more or less auditing the reports and the procedures to assure itself that it is getting what it is paying for.

Strive For A Balance

In summary, let us keep in mind the importance of adequate, but at the same time, practical tests in making decisions as to the basic type of package, the package material, and the package specifications. To achieve success, you must obtain a nice balance between the need for facts, experience and knowledge on the one hand, and the time and money required to get them on the other. One thing is sure: **There is no substitute for wisdom in making packaging decisions.** *(End)*

Complex switch patterns . . . simply set . . . with

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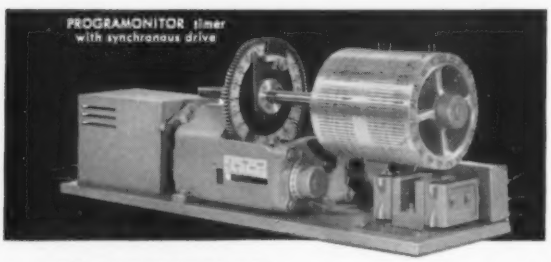
automatic recycling circuit control



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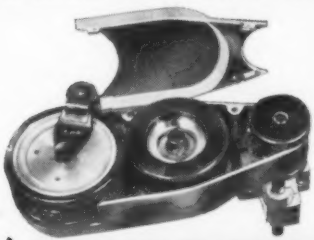

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Circle No. 262 on Card, Page 117

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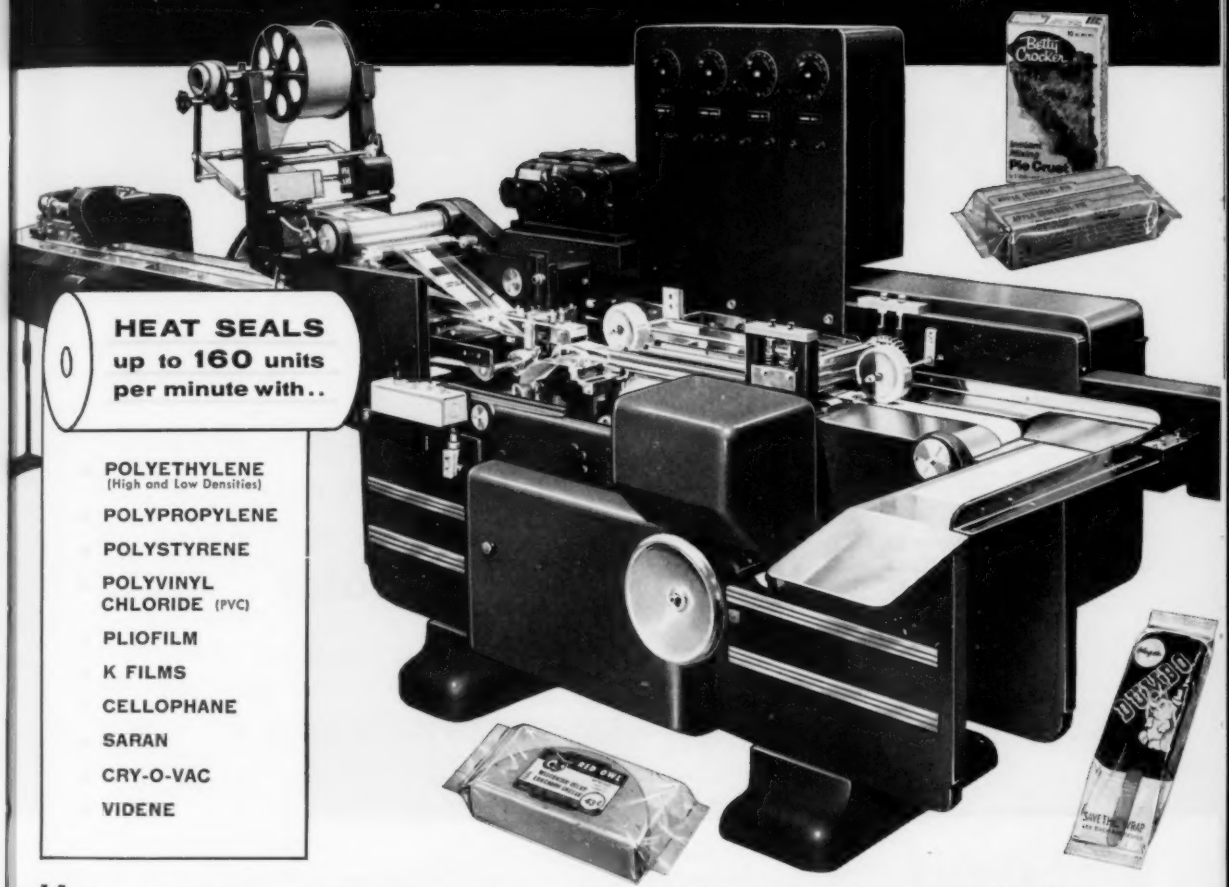
...INCLUDING SHRINK FILMS!



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High speed packaging up to *160 units per minute* with almost every type of heat-sealable flexible material—*including shrink films*—is now possible on the CAMPBELL Wrapper. Exclusive method of "float" wrapping from continuously fed roll stock permits trouble-free packaging production without static interference slow down or stoppage as in many reciprocating or sheet fed processes. It also minimizes product damage and waste. Constant automatically regulated heaters and controlled dwell-time insure positive longitudinal and cross-sealing of all materials. Special tunnel attachment provides for shrink films. Let us show you how the CAMPBELL Wrapper can wrap and seal an amazing range of product shapes in neat, close-fitting attractive wraps in less time, with less labor and with less material.

Quick Conversion from Poly to Cello

A capable machine operator can convert from Poly to Cellophane by simply installing a set of crimpers with heaters and a stationary tube sealing unit — *all in less than 30 minutes!*

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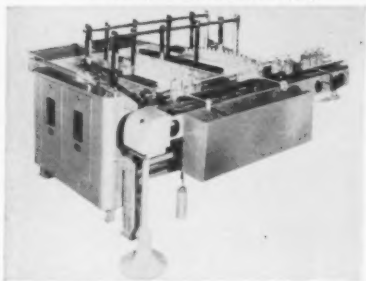

• Designed to accommodate practically any size or shape container at speeds up to 400 to 450 per minute. Bottles, jars and other containers are unscrambled *without agitation* and transfer from chain to walking beam is very gentle, without any contact of containers. Invaluable in the distillery for odd shape flasks, in the drug and cosmetic industry for unusual after-shave and hand-lotion bottles, as well as other industries wherein not only round but also unusual shapes and sizes must be handled at high speeds. Write Dept. PE4.

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Even unstable containers can now be fed with smoother acceleration using the new Kinsley Timing Screw. These screws are generated to fit each specific application. Feed practically any type containers at as much as 30% higher speed without shock and discharge them at required spacing. Used on fillers, cappers, labelers, washers, etc. Made of non-marking, tough Formica. Ask to see our representative.

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INCLINED AT ABOUT 30°, case sealers, like this one, seal whiskey cases while lifting them to overhead horizontal conveyor leading to shipping area—eliminating need of elevating conveyor.

Inclined case sealer does two jobs

While sealing filled cases, it elevates them to overhead conveyor; utilizes less floor space by eliminating need of elevating conveyor.

By Charles R. DeSpain,
Vice President and General Manager, Heaven Hill Distilleries, Inc., Bardstown, Kentucky

Having each of the case sealers on our bottling lines installed in an inclined position serves a dual purpose. In addition to sealing, they elevate the cases to an overhead conveyor. This solved our problem of how to deliver the finished cases of whiskey from the bottling room to the shipping area in the most efficient manner.

All of our bottling is done strictly on order. Because of this, it is highly desirable that the finished goods be sent from the lines directly to the loading docks in the shipping area. Also, we prefer that the

Charles R. DeSpain received a B.S. degree in chemical engineering from Speed Scientific School of the University of Louisville. Before joining Heaven Hill Distilleries in 1945, he was associated with other independent distilleries in a technical and managerial capacity. Mr. DeSpain is a member of the American Institute of Chemical Engineers and is a licensed professional engineer in the State of Kentucky.

REALIGNING GLUE POTS to be level was only major change required to incline sealers.

cases travel by gravity as much as possible—thus a saving in power.

The shipping area is adjacent to, and on the same level as, the bottling room. However, the only practical route, due to the layout of the building, is a long narrow corridor which is not wide enough to accommodate a conveyor and still allow walking space. The only solution was to install a powered conveyor about 8 ft. above floor level, running the full length of the corridor.

However, this presented the problem of how to elevate the cases from the sealers to the conveyor. Due to space limitations at the end of each bottling line, it was not possible to install the case sealers in the conventional horizontal manner and use elevating conveyors to carry the cases from the sealers to the overhead conveyor leading to the shipping dock.

To feed this conveyor, we installed the case sealers in an inclined position. The angle of incline is about 30°. Other than the angle-iron supports and several minor modifications, the major alteration necessary on the sealers was to realign the glue pots to be level.

Thus, the power unit on the case sealer carries the cases through the equipment and simultaneously elevates them to the overhead conveyor in the corridor. The operation runs smoothly and efficiently. The girl packing the cases feeds them to the sealer and they are not handled again until they reach the loading docks. *(End)*

If you use corrugated boxes...in many sizes...in varying quantities...
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Rite-Size "IN-PLANT" BOX MAKING

- **Cuts unit cost of boxes**
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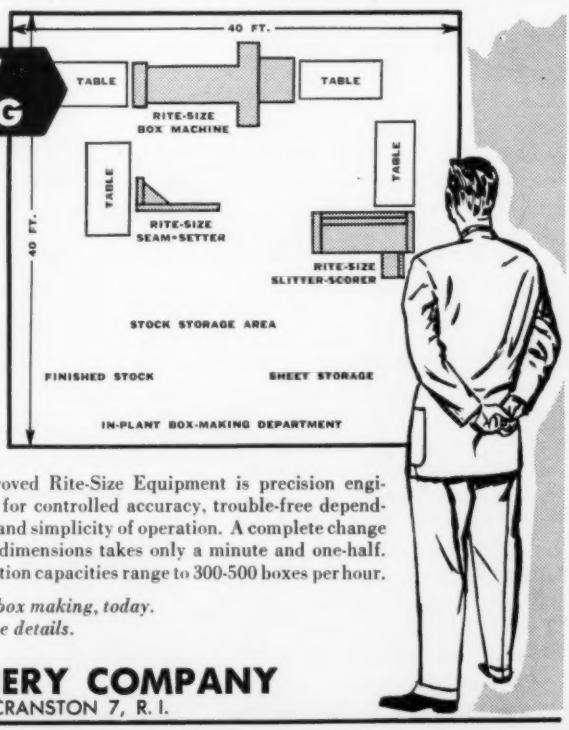
Rite-Size Equipment enables you to make corrugated boxes *to your own specifications — right in your own plant!* You can make the sizes and styles you need, in the quantities you need, at the time you need them. Box production can be coordinated to daily packing line requirements, if desired.

A complete Rite-Size box department consisting of box machine, printer, seam-setter and slitter-scorer, requires only 1600 sq. ft., including ample storage space. Compare this with the space now used for box inventory alone!



Improved Rite-Size Equipment is precision engineered for controlled accuracy, trouble-free dependability and simplicity of operation. A complete change in box dimensions takes only a minute and one-half. Production capacities range to 300-500 boxes per hour.

Investigate Rite-Size "in-plant" box making, today.
Write for literature and complete details.

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Laminations 2

Keeping track of the voluminous data in the packaging engineer's files on packaging materials can become discouraging to him unless there is some way whereby he can locate desired information quickly. Describing the key to his system, Mr. Sloan explains how it works, and lists over 100 subject headings he uses — all leading to an efficient method of filing.

A practical FILING SYSTEM for packaging information

By Francis J. Sloan,
Package Developer, Springfield, Massachusetts

Sooner or later everyone concerned with packaging materials realizes how small an amount of the voluminous data and information concerning them can be remembered. When this realization occurs, the next step is to begin filing the information, but the day-to-day additions to the file soon make it a very cumbersome and usually ineffective way to keep track of useful knowledge.

Worse yet, those who must locate needed information will soon find it increasingly difficult to find the stored technical data, samples, prices, and so on, unless a very elaborate cross-indexing system has been kept up-to-date. A further difficulty is the increasing amount of time that is required to keep the cross-indexing current.

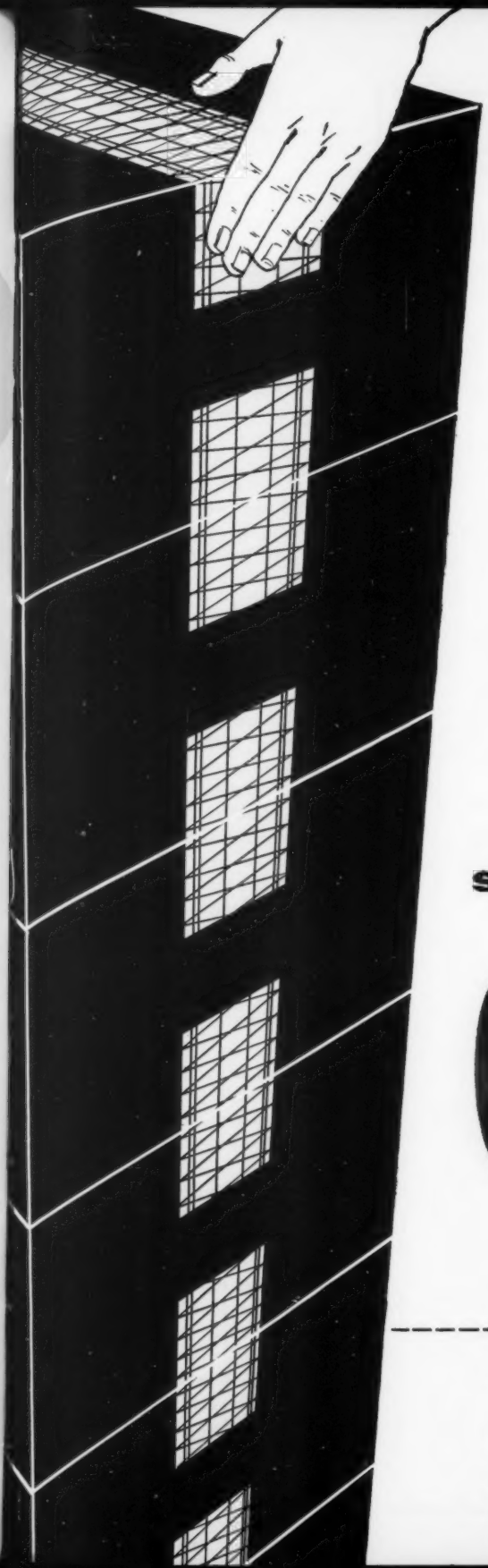
The problem is particularly acute where it pertains to filing information about laminated structures because these are composed of several components, and it is problematical which of these is to be the key to the indexing system. Usually the information in the file had been originally sought for some specific purpose, and, at the time it had been filed, it was probably indexed under the given category.

At a later date, when information about the same material is sought, it is frequently a tedious process of searching to locate the original information. You may recall its existence, but only a lengthy search through the files reveals its location.

Problem Very Practical

The problem becomes increasingly difficult as the years go by although, to a newcomer, the problem may appear more academic than practical. Yet those whose jobs require them to have quickly available a huge quantity of exact knowledge know very well

Francis J. Sloan joined Package Machinery Co. in 1941. After serving in the Air Corps in World War II, he returned to the company's engineering department where he was involved chiefly in engineering research. Engaged in package development work during his last nine years there, Mr. Sloan became manager of packaging research in 1955. He resigned in 1959 to become an independent consultant in package development. He is a professional member of Packaging Institute and an associate member of Technical Association of the Pulp and Paper Industry and Package Designers Council.



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SECTION 1 — Foil
(All foils & foil laminations)

Coated	1
Embossed	1
Heat Sealing	1
Laminations	1
Non-Heat Seal	1
Plain	1
Special	1
Suppliers	1

SECTION 2 — Film
(All films & film laminations — no foil components)

Acetates	2
Cellophane, Moistureproof	2
Cellophane, Plain	2
Cellophane, Polymer-Coated	2
Coated	2
Laminations	2
Pliofilm	2
Polyester	2
Polyethylene, General Information	2
Polyethylene, High-Density	2
Polyethylene, Low-Density	2
Polyethylene, Medium-Density	2
Polystyrene	2
Saran Types	2
Special	2
Suppliers	2
Vinyl (PVC)	2
Vitafilm	2
Water Soluble	2

SECTION 3 — Paper
(Includes no foils or films)

Coated	3
Fancy	3
Glassine-Coated	3
Glassine Laminations	3
Heat-Sealing	3
Impregnated	3
Kraft, Misc.	3
Kraft, Natural	3
Labels, Gummed	3
Labels, Heat-Sealing	3
Metallized	3
Parchment	3
Sulphite	3
Suppliers	3
Tissue	3
Waxed	3

SECTION 4 — Non-Flexible
(Board & plastics)

Acetate	4
Bleached Pulp	4
Bleached Solid Sulphate	4
Chipboard	4
Coated Board, Heat-Sealable	4
Coated Board, Non-Heat-Sealable	4
Corrugated, Double-Faced	4
Corrugated, Laminated	4
Corrugated, Single-Faced	4
Corrugated, Special	4
Kraft, Natural	4
Laminations	4
Polyethylene	4
Polystyrene	4
Special Board	4
Suppliers	4
Thermoplastic Foams	4
Thermosets	4
Vinyl	4
White Patent-Coated News	4

SECTION 5 — General Information

Adhesives	5
Allied Information	5
Costs, Material	5
Costs, Supplier	5
Closures	5
Containers, Bags & Pouches	5
Containers, Corrugated	5
Containers, Folding Cartons	5
Containers, Glass	5
Containers, Metal	5
Containers, Plastic	5
Containers, Set-Up	5
Containers, Suppliers	5
Containers, Wrapping	5
Convenience Devices	5
Data, Tech., Comparisons	5
Hot Melts	5
Labels & Tapes	5
Machinery Data	5
Printing Results	5
Specifications	5

how the stored material fills filing cabinet after filing cabinet.

One veteran in the packaging field had two full size filing drawers filled with information on a single subject – the packaging of poultry. This was a 25-yr. accumulation of data, memoranda, reports, tear sheets, reprints, letters, catalogs, and the like.

Hard To Keep Abreast

With new packaging materials arriving on the market every year, and the much more frequent arrival of laminated structures, the problem of keeping abreast of all possible information is apt to become discouraging, if not chaotic. Having faced this type of problem myself for many years, I was forced to devise a practical system of keeping track of all the information needed in my work. The system has proved to be very useful and is offered here as a suggestion that can be modified or adapted to the needs of nearly every situation.

The minimizing of glass and metal containers in this system is not very significant, for these materials, or containers fabricated from them, do not offer the complex problems of filing that are found with respect to paper and plastic materials that are often joined together by lamination.

Flexible Packaging

The key to this system of filing information about flexible packaging materials is relatively simple. If foil is a component of a laminated structure, or is used alone, it is filed in a separate section. Let us call this Section 1.

Films and laminations with no structure containing foil will be listed under Section 2.

All other flexible materials without foil or films in their makeup, i.e., paper, will be listed in Section 3.

Section 4 will be non-flexible materials and will include: paperboard, molded pulp, plastics, etc.; and must include other rigid packaging materials such as glass and metal. *(Turn page)*

Definitions

For filing purposes, certain definitions are needed. For my own use I have adopted the following:

Paperboard—Any packaging material containing paper which is more than 0.010 in. thick.

Flexible—Materials which, under the conditions used, can be crease-rolled or plow-folded without severe damage. (All others would be considered to be rigid or non-flexible materials.)

General Information Subjects Are Also Needed

Provision for general information should be made in addition to the subjects listed in Sections 1, 2, 3, and 4. The general subjects should include such topics as:

Material costs,
Technical data,
Specifications,
Machinery,
Bonding agents,
Converter information,
And a general category called "allied information."

On the subject of material costs there are several bases for pricing and reckoning costs. Yet it seems to be customary to report many consumer types of packaging materials on the basis of cost per 1,000 sq. in. This figure can be easily converted to or from: cost per 1,000 packages, cost per sq. yd., or other basis of cost, without annoying calculations. This part of my filing system was developed after working with various industries when the confusion arising from their differing methods of pricing forced me to adopt a common basis.

You Can Expand It

With this classification system as the base and the use of simple reasoning, it is possible to set up an easily expandable filing system for packaging materials which is easy to use. Or, an existing but unmanageable system, may be overhauled and made workable. But the real test is the ability of the system to permit easy and rapid access to information when it is wanted. *(End)*

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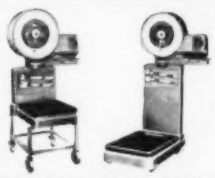

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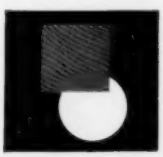

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Part III — Pre-breaking scores and other manufacturing details

Practical pointers to better folding carton performance

Pre-breaking of cross grain scores in folding cartons in many instances contributes to, and on high-speed equipment is essential for, efficient, trouble-free cartoning on a packaging line. In fact, many carton manufacturers routinely pre-break cartons (unless directed otherwise) and countless package users automatically specify pre-breaking.

However, there are exceptions — situations where pre-breaking is unnecessary, perhaps even detrimental. The point is that a package user needs to learn for itself just how much pre-breaking its carton and packaging conditions need. In this connection, it helps to remember the basic purpose of pre-breaking cartons: To facilitate their handling on automatic packaging machinery.

Need More Than 90 Degrees

The purpose of pre-breaking is to "take the fight" out of carton blanks so as to facilitate forming and squaring them up on cartoning equipment. Therefore, it might appear that the way to accomplish this is to specify just 90° of pre-break. However, in practice, it is necessary to pre-break *beyond* 90° to assure that the carton squares up properly and remains "in square."

In other words, to take out the carton's resistance to squaring up easily, pre-breaking beyond 90° is necessary. However, there is no "magic number" or precise amount of pre-break that a user can specify to assure trouble-free carton performance. **While a few generalizations afford helpful signposts to proper pre-breaking, the particular experience and conditions of a given plant with its own cartons is the best guide.**

Must Know Conditions

Large users, for example, nationally known manufacturers of food or soap products, have detailed carton specifications covering, *Inter alia,* pre-breaking. But just because one of these users specifies 135° or 160° of pre-break is no reason for other users to adopt these requirements — unless the latter are sure of why they are doing it, and unless the operating conditions are similar.

Generally speaking, 110° of pre-break is about the minimum, according to carton experts in user and supplier companies. Further, 160° to 165° represents the normal maximum limit of pre-breaking. But many companies specify 180°. Heart of the matter is that determining the optimum figure requires trial and error. Production experts of a carton plant can be helpful on this point.

There is more to this than pre-breaking itself. For example, one company reports getting peak cartoning line effectiveness by specifying 180° pre-breaking. At the same time, this user plant relates its pre-breaking experience to as rigid a program of moisture content and board selection control as a carton manufacturer can realistically maintain.

Make Trial Runs

However, experience is still the best way to hit on a pre-breaking requirement. Though achieving that experience has often been expensive, it need not be.

For example, when a new line is about to start up, or when a new carton is to run on an existing piece of equipment, it will save both user and supplier many hours of heartache and frustration, as well as downtime and re-runs, to determine what degree of pre-break is required *before* specifications are formalized.

This can be done painlessly and with little effort if the user will have the carton supplier furnish a few cases (or any quantity requisite to establishing carton performance on the machine) each of cartons with a 120°, 135°, 160-165°, and 180° pre-break. The carton user, preferably under the supervision of a responsible person, can then try them out, one behind the other, and determine, in advance and from knowledge instead of guesswork, what the minimum and ideal pre-breaks are, and what tolerances it can put up with.

Benefits

Doing this at one crack rather than piecemeal is easier for carton supplier and user alike. Also, extra benefits can result. For example, broader tolerances may be established by the carton user than would otherwise be specified. In general, narrow tolerances (often based on pre-conceived notions) cost money and usually the user is the one who, in one form or another, has to pay for them, though it may not be conscious of it. Thus, the broader tolerances can very well result in lower carton manufacturing costs, which frequently are passed on to the user.

It is often advantageous for the

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Tubes are made of MARLEX by Plax Corporation, Hartford, Connecticut. They can be filled and sealed with standard tube-filling equipment.

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Outboard enthusiasts can now buy this superior gear oil packaged in this convenient applicator tube made of MARLEX.

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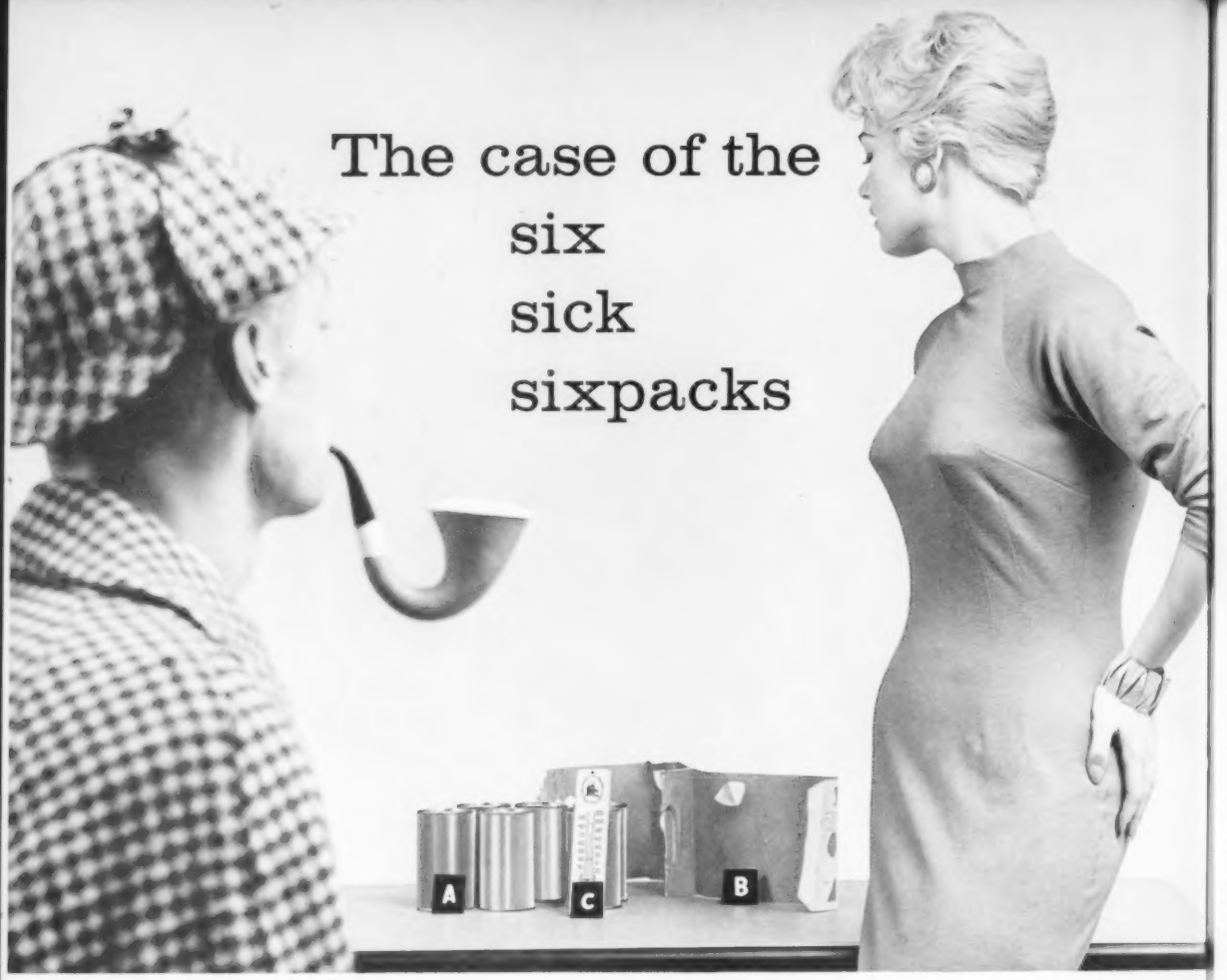
The case of the six sick sixpacks



FEARLESS FULLER: Miss Watson, do you know what a perfect 36 is?

MISS WATSON: Oh, Fearless, you've been peeking at my sweater size.

FEARLESS FULLER: Come now, Miss Watson, let's keep our minds on business. When I say perfect 36 I mean six sixpacks of beer.

MISS WATSON: Hmmmmmmmm.

FEARLESS FULLER: My most recent case involved an imperfect 36.

MISS WATSON: An imperfect 36?

FEARLESS FULLER: Yes, note the cans of beer on the table, and the tattered six-pack cartons that once held them.

MISS WATSON: Someone must have been awful thirsty, to tear those cartons apart like that just to get a beer.

FEARLESS FULLER: Not at all, Miss Watson. The fact is that the adhesive sealing the six-pack bottoms was not Fuller's and gave way and spilled the beer cans on to the floor.

MISS WATSON: Was that because the cans contained what some people call a heavy beer?

FEARLESS FULLER: Please, Miss Watson. Let me call your attention to the thermometer. Exhibit C.

MISS WATSON: What's that got to do with it?

FEARLESS FULLER: Well, as you know, beer is subject to varying temperature and humidity conditions. From warehouse to truck to shelf to cooler and maybe back to shelf again.

MISS WATSON: And?

FEARLESS FULLER: These changing humidity and temperature conditions weakened the adhesive bond, causing the cartons to break, spilling the cans of beer.

MISS WATSON: What was the right solution to the Six Sick Sixpacks case, Fearless?

FEARLESS FULLER: I recommended switching to Fuller's Adhesive #504. Now the case, or should I say cases, are permanently closed.

MISS WATSON: You're amazing, Fearless.

FEARLESS FULLER: Elementary, my dear Miss Watson. A Fuller man always knows the correct solution for adhesive problems.

Your Fuller man is ready with the correct solutions on any adhesive problems for you, too. Contact your near by plant.

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carton user to have the carton supplier present at this performance tryout. *Seeing* what does and does not work dramatizes the user's requirements to the supplier in a way that *telling* or the printed page cannot. Concurrently, it affords the user the opportunity of receiving on-the-scene hints and suggestions from the supplier, that might result in higher machine speeds, prevention of downtime, and minimizing of waste, which, together, can add up to significant economies.

Don't Take For Granted

Carton suppliers also emphasize the need for caution and thorough pre-testing on the cartoning machine whenever carton changes are made. No matter how trivial the change may seem to the user, even slight changes in carton grade, caliper, stiffness, dimensions, etc. (if unchecked beforehand on the machine), can produce serious operating difficulties and losses on the packaging line. "Little" changes often cause more trouble than major ones because the red flag is out for the latter, while the former are taken for granted.

This focuses attention on an important point of carton usage: Before letting a carton plant proceed with turning out a high-volume, long-run carton supply, the user should be certain of what it is getting. This means allotting adequate experimentation and trial-and-error runs. However, even in large, well-run companies (user and suppliers alike) this is not always done.

Share Enough Information

It all drives home the importance of sharing information between user and supplier. Although important in all areas of package effectiveness, it can be of particular significance with regard to the all-important pre-breaking operation. Further, the presence or absence of pre-breaking sometimes has other effects on the packaging operation. One example illustrates the point.

In this instance, the user's operation involved forming the carton blanks around a mandrel, after which the formed cartons moved by air ejection to the next phase of the operation. Cartons used were from two suppliers. One of these was routinely pre-breaking its cartons and the other was not. Cartons produced by the company doing the pre-breaking were falling off the mandrel instead of staying in place for the required time interval.

Finding Answers Takes Time

But as every production manager knows, the answer to the problem does not present itself as simply and as quickly as the statement of the problem on these pages suggests. As frequently happens, both user and supplier experts dug systematically into the problem, step by step.

For example, a suggestion came up that the cutting and creasing die might be off, but careful checking of the die proved it to be correctly made. Further speculation posed the possibility of cartons not being duplicates of each other – but they actually were.

In fact, physical tests showed the malfunctioning cartons to be of a slightly higher quality than the functioning cartons. Still other inquiries pointed to incorrect fabrication at the supplier's plant, but no significant deficiencies came to light.

The possibility that a slight taper from a minutely crooked glue seam on some of the troublesome cartons was causing the malfunctioning, proved unfounded when perfectly aligned cartons from this supplier, without a taper, also fell off the test mandrels. Caliper was under control, scores were satisfactory. Test mandrels were identical in size to the machine mandrel. But there still was no explanation for the cartons continually falling off the mandrels.

They Didn't Know

Finally, step by step, the investigation showed that the com-

Fuller's 504 Carton Adhesive Resists Moisture

This adhesive has a thin fluid viscosity — machines well on modern, high-speed equipment. Dries to a highly water-resistant bond, so important on six-pack and bottle-carrier cartons. With Fuller's 504 you're sure of a seal that stays sealed even under high humidity storage conditions.

504 sets fast, too. Controlled penetration quality assures strong bonds on all board surfaces.

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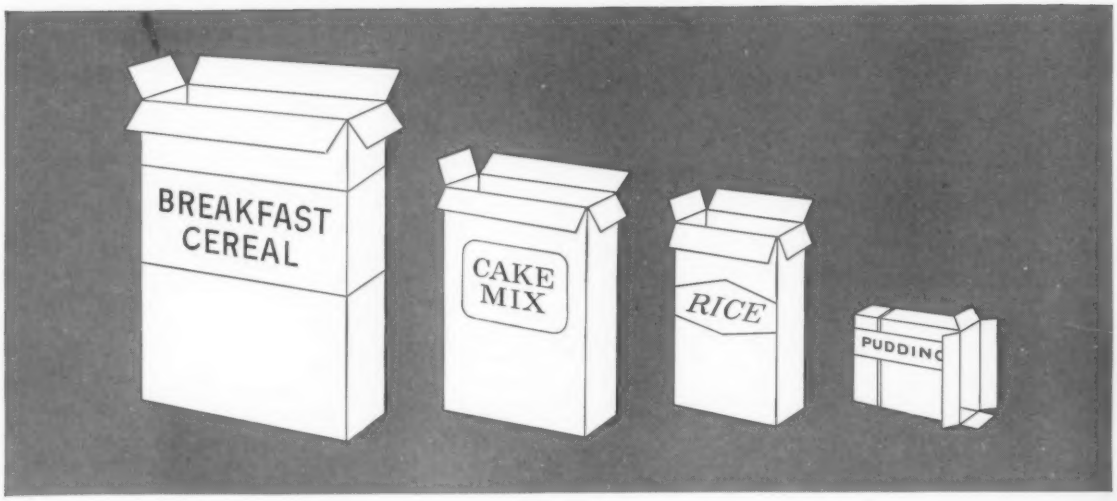

Now, *with no increase in cost*, many printed packages, even those made from the lowest grades of printing boards, can be upgraded to bright cartons—*all white inside and out*—made from 100% virgin bleached fibre . . . new HiYield Printkote.

As its name implies, a ton of HiYield Printkote contains more square feet per ton than higher density boards and, therefore, yields more cartons per ton.

Due to its high yield and strength, HiYield Printkote cartons are comparable in cost to many cartons made from much lower printing grades of non-virgin fibre boards; however, there is no comparison in appearance and uniformity.

HiYield Printkote is another member of the family of fine Brite-Pak bleached boards. It is the economical bleached board that will prove superior in many packaging applications where cost is a major consideration and printability a factor.

However, for the best bleached board, always look to West Virginia's companion grade, Brite-Pak Enamel Coat, which users say is the finest coated bleached board in its field on the market.

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West Virginia Pulp and Paper

pany whose cartons were falling off was pre-breaking its cartons, and the company whose cartons stayed in place was not. Thus, the cartons that were not pre-broken tried to revert to their original, pre-glued state, and in so doing, tended to resume a parallelogram shape on the mandrels, which enabled them to hug and cling to the mandrels.

The pre-broken cartons, having the fight taken out of the vertical scores, had no impulse to revert to the flat state and tended to retain their squared-up, rectangular shape. Since the forming mandrels were slightly undersize with respect to the cartons, the pre-broken cartons fell off as the mandrels moved away from the bottom-sealing pressure station.

Sure, the mandrels should not have been undersize — but they *were.* The point is, **had the user and supplier discussed the subject in the first place, all concerned would have known about pre-breaking requirements, thus avoiding some cartons with, and some without, pre-breaking.**

Which Scores To Pre-Break?

A general rule is that pre-broken scores are necessary for cartons going through automatic packaging machinery, particularly high-speed machinery. But this boils down to the question: **How much pre-break is necessary to provide easy setting-up of the carton?** This directs attention to the matter of which scores to pre-break for peak cartoning performance.

Where the carton has a glued glue-lap, two of the scores (CD [cross direction] Scores 2 and 4, in standard carton terminology — No. 1 being adjacent to the glue-lap) are always pre-broken in the course of folding the blank over for gluing. It is the other two CD scores (Nos. 1 and 3 (which require specific pre-breaking, and for which users write pre-break specifications.

Incidentally, and within limits, there generally is no damage to properly formed CD scores from pre-breaking them. Except in rare and unusual instances, there is no pre-breaking of MD (machine direction) scores — the scores on which the end-flaps and dust flaps of seal-end and tuck-style cartons are generally hinged.

Score Requirements Differ

Another way of looking at it is that two body scores of pre-glued glue-lap cartons are automatically pre-broken 180° and need no pre-break specification, though frequently these are included on user's specification sheets. While many user companies specify that all CD scores should receive 180° of pre-breaking, some experts assert that this amounts to over-specifying and that the glue-lap score in particular needs only 135° of pre-breaking.

It helps to remember that, in the course of pre-breaking (which is usually done, incidentally, on the gluer in the carton plant) there is a bowing of the board. This means that, when a carton blank

this IMPACT-O-GRAPH saved a shipper $9,000.00 in one year!

Fantastic, you say? Not at all.

Savings like this are being made all the time by companies who use Impact-O-Graphs to pre-test shipping conditions before designing packages. This avoids both underpackaging and overpackaging.

Yet the instrument used in this case cost only $185.00 — a mighty low investment for such a saving.

By all means send for the complete brochure describing all models of Impact-O-Graphs. Then you can prove you're right on package design — and save money too! It's N.S.T. approved. Leasing arrangements are now available.

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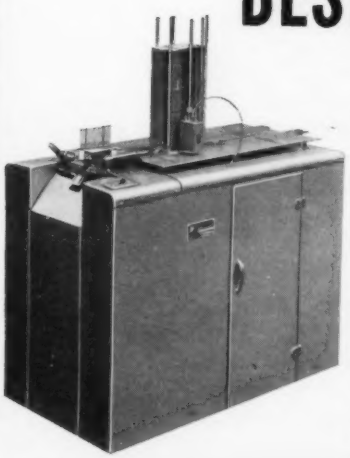

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"There's just nothing like a metal tube"

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  No space is ever wasted by a metal tube; it folds right up to fit the product skin-tight. Users appreciate fold-up tubes that tuck into small space—in an attache case, or even a purse.

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  A tube's positive closure insures against leakage under the bouncing, jouncing, and changing conditions of travel.

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  No matter how you beat up a tube, it still functions as intended. Drop it, throw it, step on it, it's still a tube and acts like one.

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  Almost anyone can exert the gentle squeeze that makes a tube work—even children, and hands crippled by arthritis. You don't have to put your foot on a tube to operate it.

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  A tube is an easily-controlled dispenser. It doesn't spurt or squirt; just emerges smoothly and calmly.

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  Little tubes are fine for travel, guest, office, or little people. Families come in different sizes, too, and so do uses for many kinds of fluid products. Tubes take care of every capacity need—inexpensively.

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is pre-broken, there may be 135° of pre-break at the actual zone of the score, and near the bead. However, at the outer edge or end of the board, there may be as much as 160°. This is because of the board being bent over.

The converse of this is that, because of the bowing effect, even though a user specifies a 160° pre-break, the cartons may not receive that much. Rather, they may get only about 135°. Similarly, it is hard to secure a 180° type of pre-break on a glue-lap score. It may be 180° only if rolled down.

No Precise Figures

This emphasizes that pre-breaking deals largely with approximations rather than exact figures. And above all, **it is important to work out the requirements in terms of particular cartoning conditions.** For example, the higher the speed of automatic cartoning, the more necessary it is to eliminate points of resistance, by providing an adequate pre-break. In contrast, older and slower models of cartoning machinery (as well as manual cartoning operations) may need little, if any, pre-breaking.

Because a carton plant can seldom give an exact amount of pre-breaking, **users must develop their requirements in terms of satisfactory performance with the resulting cartons, rather than simply insist on a certain degree of pre-breaking.** For instance, if the carton requirement calls for 180°, the conditions may be such that it is hard to get a full flattening position. The higher the speed in the carton plant operation, the less time there is for the blank to be motionless.

Predicting Pre-Break Requirements And Tolerances

The Ohio Boxboard score-bend tester is an instrument recently developed primarily for predicting and measuring the ease and consistency with which carton flaps will bend over an MD score, together with their springback tendency. Intelligently used, it can also provide a guide to pre-breaking re-

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Aqua-Flakes are high quality liquid glue that has been dehydrated. They give lowest possible cost wherever volume is large. Only the water has been removed. Only the water has to be replaced. Simply by mixing the flakes into water.

Aqua-Flakes eliminate the problems of old-fashioned cold water solubles and cookup dextrines. No lumping. No changing characteristics due to heating, cooking, storing. No evaporation and bodying up. No wasted batches.

Aqua-Flakes film smoothly. Tack fast. Give excellent coverage. They are used in combining, laminating, heading and wrapping, tube winding, etc. Contact your nearest National office for information.

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TABLE

Results Of Force* Required To Bend CD Scores With Various Degrees Of Pre-Breaking

Pre-Break Degree (Hand, no ironing of pre-broken scores.)	Supplier	Force Required To Bend CD Score 90°	Force Required To Bend Same Score 90° After Springback From 90° Bend
None	A	430	270
	B	360	235
	C	320	240
90°	A	310	310
	B	280	260
	C	250	235
135°	A	160	160
	B	160	160
	C	160	160
165°	A	130	130
	B	130	130
	C	120	120
180°	A	100	100
	B	110	100
	C	105	90

*Determined on Ohio Boxboard score-bend tester.

quirements and performance – subject to confirmation by, and never as a substitute for, carton performance on the specific packaging machine of the user.

Data (see table) on a typical seal-end carton (in this instance 0.016-in. white, patent-coated news from three suppliers to a national user) illustrates the principle, and indicates, for the cartons tested:

1. 90° pre-break is inadequate.
2. 135° pre-break, depending on packaging machine requirements, could be acceptable.
3. 165° pre-break most likely will give excellent carton performance – almost as good, depending on packaging machine requirements, as 180°.
4. The increments of improvement after 135° pre-break are much less than the 135° pre-break exhibits over 90°.
5. Pre-breaking 135° or more tends to wipe out differences in board, scoring, and springback, from the three suppliers, from the standpoint of ease of forming on automatic packaging machinery.

Not enough data is shown to know whether other types and calipers of board would behave the same way. **An important point:** Remember that data *cannot* be applied indiscriminantly; apples should not be confused with oranges – each individual type carton should be evaluated on its *own* merits!

Pre-Break Unglued Cartons

Incidentally, pre-breaking usually refers to cartons which are to go through a gluing operation in the supplier's plant. However, pre-breaking can be just as important with unglued cartons. For example, plants using butter cartons often specify pre-breaking even though the cartons are not to be glued. It is necessary to pre-break the scores in order to have proper folding and tucking action.

(Next page)

Regardless of your gluing needs . . . spotting, rolling, striping, doweling, etc. . . . you can incorporate new Internal Valve FF Glue Guns in your automatic machines . . . existing or new! Over 400 sizes, models to choose from . . . with each unit designed for fast, clean gluing without waste. Easy installation. Guaranteed. Send for your catalog on this marvelous way of "Controlled Gluing". Oh yes . . . FF Guns can be used manually . . .

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PACKAGE engineering
185 North Wabash Avenue, Chicago 1, Illinois

With this style of carton construction, the grain direction is running the wrong way from the standpoint of getting the flaps to fold properly. The construction involves a five-panel folder, and, to have efficient cartoning, it is necessary to omit consideration of grain direction.

Another aspect of pre-breaking is that it can be a most critical factor from the standpoint of score-cracking the top liner of the carton. This is important, and means that providing the *optimum*, or slightly under the optimum, degree of pre-breaking is better than providing an excess just to have an "insurance policy" of packaging line effectiveness with such cartons.

Need More Information

There are many unanswered questions about pre-breaking. For example, the packaging field does not know enough about *horizontal* versus *vertical* cartoning as specifically related to pre-breaking. Experts in user and supplier plants offer no way of knowing whether cartons handled horizontally need more pre-breaking than those handled vertically. But reports indicate that some large users are looking into this, and that manufacturers of cartons and cartoning machinery hope, also, to find some answers.

Although pre-breaking merits major attention because of its effect on packaging line performance, other points of carton manufacturing and structure features deserve consideration. Gluing is an example of these. For example, there are three thicknesses of board at the glue lap of a carton; two thicknesses elsewhere.

Packaging Machine Feed Problems

This can be a source of trouble if cartons do not stack correctly in cartoning machinery magazines. Carton manufacturers can compensate for this difficulty, for example, by proper roll-down on CD Scores 2 and 4 on the straight line gluer so that carton piles are flat. Thus, if the user communicates its re-

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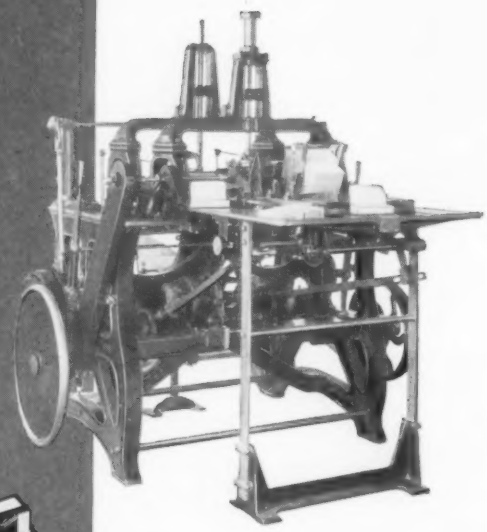

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quirements to the carton producer, the latter can be of real help in furnishing cartons that stock correctly. This depends on the supplier's knowing just what cartoning machinery the user has.

To insure good feeding from the packaging machine magazine, carton users sometimes wonder about the advisability of specifying shear glues – adhesives that resist shearing forces, but which have weak bonding characteristics – to hold lightly the back panel of a carton to the front panel of the adjacent one. Some suggestions have arisen in the packaging field that such glues aid carton performance. In general, this appears to be another area of unanswered questions, and users and suppliers alike concede the need of more exploatory work along these lines.

Reports indicate, for example, that, when two cartons are shear-glued, the printing on the outer liner is defaced when the cartons separate. But presence of skeletal information shows that experience as reported may not be conclusive on this point.

Inside Dimensions

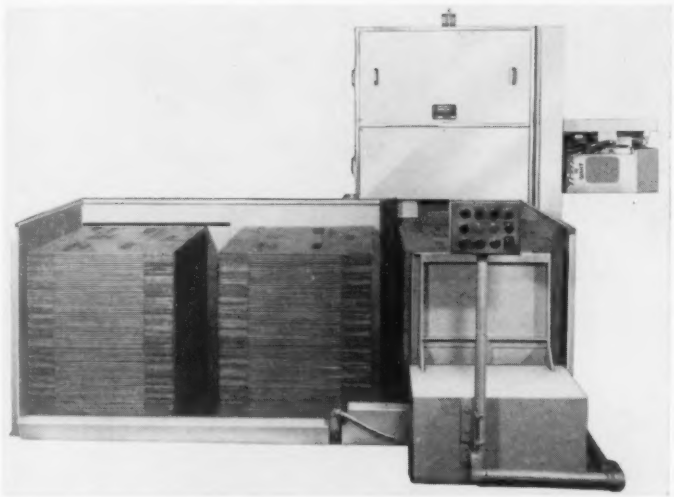
Inside dimensions are important. Experienced package users often say that they will not specify just how a carton manufacturer goes about attaining a particular precise dimension. Instead, they let suppliers set their scoring dies and provide make-ready so that the desired end-result is obtained: good scores and proper inside dimensions – in terms of the type of board used for the cartons as well as the particular cartoning machinery involved.

(Our next article will examine problems of handling, transportation, and storage of cartons, as well as factors to consider in maintaining correct carton-performance conditions in the user plant.)

If you need a copy of Parts I and II of this series, we will send a single copy free of charge as long as our supply lasts. Write on your letterhead to our Reader Service Department.

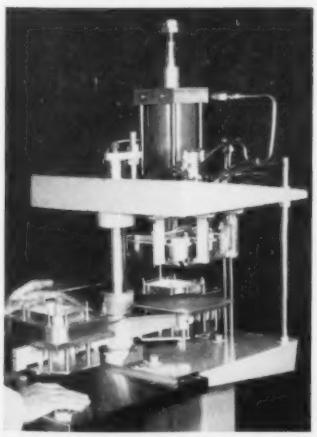
ANNOUNCEMENTS OF MACHINERY AND PRODUCTS

Beneath each announcement is a code number. As you select items on which you want more information, *note* this number. Now, *circle* the corresponding numbers on the postcard, Page 117. Next, *fill* in your name and address. Then, *mail* the card — we pay the postage.



Case Former

Caral Packaging Machinery, Inc. announces the availability of its new shipping case former which forms 20 shipping cases/min. No operator is needed with this fully automatic unit which adjusts to standard or special case sizes and adapts to all standard case packers with a minimum of modification, Caral says. Cases are loaded at floor level and formed from the top of the stack. Photo shows 280-case load; magazine capacity is limited only by floor space. Circle No. **1.**



Polystyrene Sealing Unit

G. T. Schjeldahl Co. introduces a new polystyrene-sealing machine which can seal polystyrene covers to polystyrene containers so that the resultant seal is shock-proof and crack-proof, according to the manufacturer. Unsealed packages are inserted by operator at front of machine, whereupon they rotate 180° to rear of machine, where they are sealed by high pressure and low heat. Circle No. **2.**

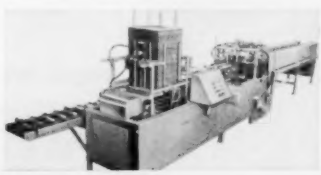
Hand Filler

Elgin Manufacturing Co. has introduced a new hand filler adaptable to a broad range of liquid or viscous

products, such as for "boil-in-bag" filling. An adaptation of Elgin's automatic "single-valve filler", the machine has a single revolution clutch and covers a range of container sizes up to 32 oz. It can also be equipped with special size cylinders and pistons for larger or smaller capacities, Elgin says. Occupying floor space of 24x36 in., the machine is available with a reservoir or manifold feed. An agitator can be inserted in the reservoir for products that require it. Circle No. **3.**

Automatic Casing Unit

FMC Packaging Machinery Division announces its Model 41, a new casing machine available which auto-



matically opens, erects, loads and seals cases at speeds up to 25/min. It incorporates pneumatic accumu-

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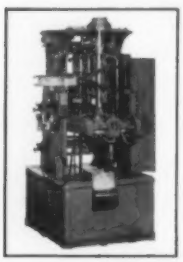
Only Hayssen compact gives you complete one step packaging from product processing to labeling. Now, the new Hayssen header labeler permits you to automatically label as you package, trimming your packaging labor requirements by at least two, helping you maintain high speed production and eliminating side trips to semi-automatic equipment.

New Hayssen Header Label Attachments are now in use at Kroger Co., Dayton Nut, King Nut and Kar Nut packaging plants.



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lating and loading principles, FMC says. Feeding is from a vertical stack of up to 200 flat cases with positive vacuum cups to strip-off the bottom case. Packages to be cased are positioned, accumulated by rows, elevated to complete any tier pattern, then end or side-loaded. The casing unit has an enclosed, pressurized glue system equipped with a "no-case-no-glue" control. Circle No. **4.**

● Carton Set-Up Unit

Thiele Packaging Machinery Co. announces a series of three carton set-up machines. Cartons as large as

12x8x20 in. and as small as 1x5/16x5 in. can be set up automatically. These units feature 180° reversing of the carton and ironing of score lines to provide a carton fully squared before gluing, according to Thiele. The continuous motion machines fold carton bottom flaps square and flat after gluing and set-up cartons can be conveyed immediately to filling or loading machine. A self-contained vacuum system includes pump and vacuum valve that will not plug up with dust, Thiele says. Glue pot is removable with single locking device. Circle No. **5.**

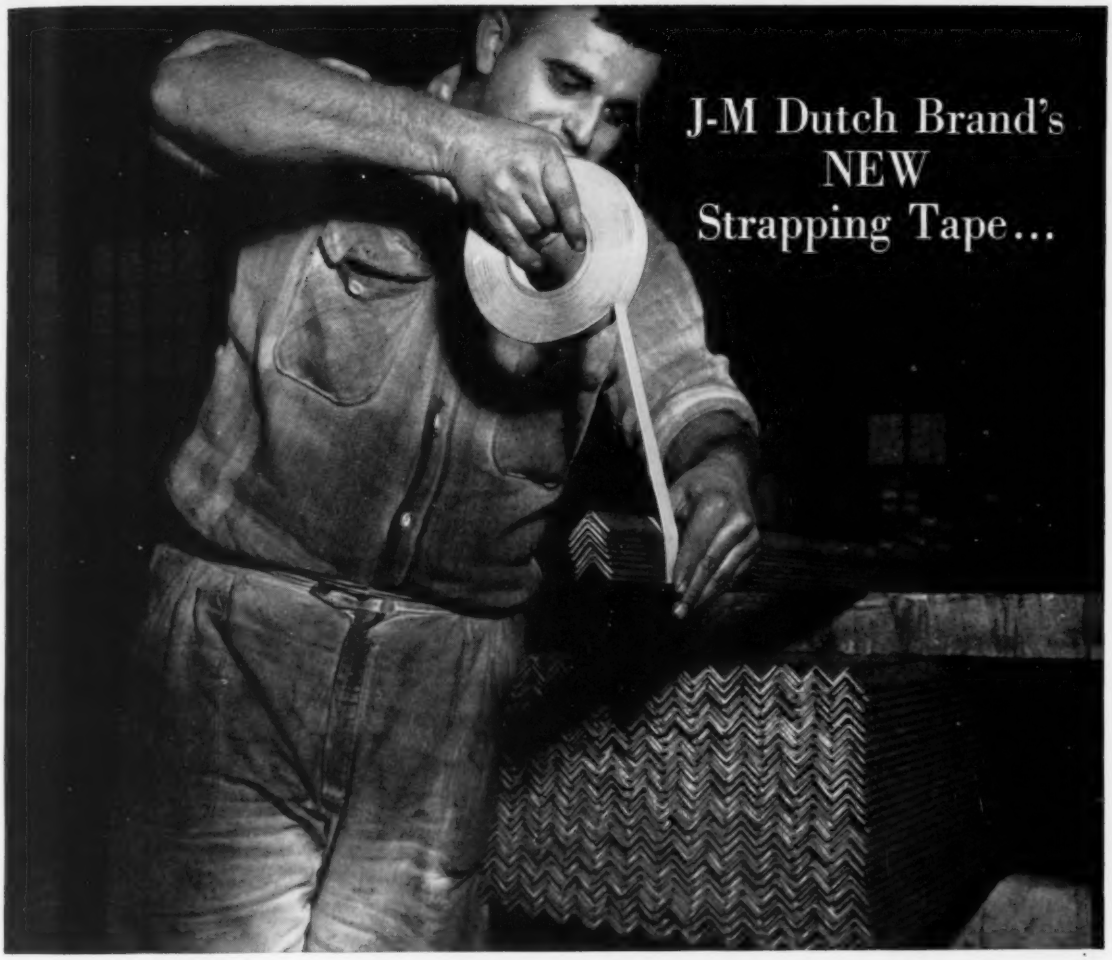
● Box Opening Tape

Nashua Corp. introduces Peelac, a new peelable corrugator's tape designed for application to boxes by

the boxmaker. Nashua says Peelac is a water-activated tape that provides a strong, secure bond at the joint and closure points, yet may be zipped off quickly and easily with the fingers. This new tape makes possible the use of shipping cartons for tray-stocking of shelves. Circle No. **6.**

● Beaded Open Top Can

Continental Can Co. is offering a fully beaded body on the 303x406 open top can for packing selected fruit and vegetable products. The beaded body construction increases



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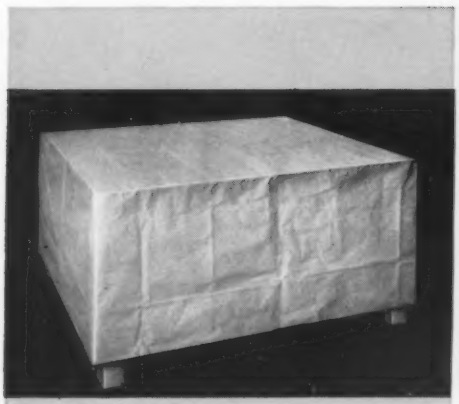

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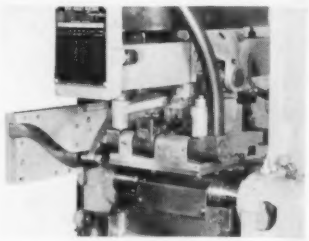
panel resistance, reduces shipping and handling damage, and reduces denting and out-of-round containers, Continental says. Circle No. **7.**

● Labeling Attachment

New Jersey Machine Corp. announces that its Pony Labelrite can now be made available with an extra



motion so that the normal horizontal delivery of the label can be converted to the vertical place. This contributes to fitting the labeling operation into an integrated, automatic packaging line, New Jersey says. Circle No. **8.**

● Liquid Filling Attachment

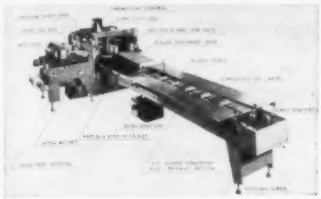
National Instrument Co. has introduced a new multiple-stroke attachment which extends the filling range

of its Filamatic liquid filler 19 times. The attachment consists essentially of an automatic reset predetermining counter which can be preset for any number of cycles up to 19, depending upon the volume of liquid to be dispensed, National says. To initiate the filling cycles, the operator depresses a foot switch. When the preset count is reached, the filler comes to a stop automatically. Containers may be filled two or more at a time by operating the machines in tandems. Circle No. **9.**

● Wrapping Machinery

Oliver Machinery Co. announces development of six models of its Series 899 wrapping machines. Producing from 20 to 70 packages/min, each unit consists of three sections: (1) the infeed conveyor with its package transfer; (2) the film-feed unit; and (3) the main frame housing the package elevator, the folding-wrapping-sealing mechanism, the discharge conveyor, and vacuum sheet-feed belt. A continuous-motion

transfer advances objects being packaged to surface of elevator



where first bottom and end folds are formed over object being wrapped. The film can be snug or loose around the object. The film-feed section has an automatic motorized unwind system. To form complete closures, there are two types of bottom seals—overall heat seal and narrow line seal to minimize film distortion—and two types of end seals—overall heat seal developed by continuous-motion belt over both end surfaces of the package and a narrow line seal at each end of the package. Circle No. **10.**

● Heat-Seal Wrapper

Anderson Bros. Mfg. Co. has completed a new Model 593 Seal-O-Matic wrapper. It is designed to operate as a companion unit to Model RIA-6 Gram unit for mass-producing stick novelties. Model 593, when installed, replaces the Gram bagging equipment, and will completely wrap and heat-seal individual stick novelties at a production rate synchronized to the full range of Gram unit production. The new model features slow and gentle handling action and, when running 750 doz. pieces/hr., it cycles approximately every 3 sec. Circle No. **11.**

● Colored Stencil Inks

Bostitch, Inc. has added five fast-drying colored inks to its line for use in Stencil-matic rollers to label

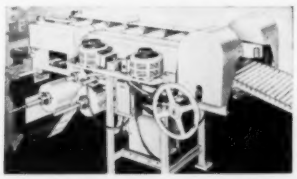
metal or porous surfaces. Red, blue, yellow, white, and green are the ink colors available. Circle No. **12.**

● Silicone-Coated Multiwall Bag

Olin Mathieson Chemical Corp., Packaging Div., announces development of a multi-wall bag with a silicone coating on the inside for packaging tacky materials. The coating prevents adhesion of the bag to the material being packed, and cannot contaminate the packaged product. It remains inert, Olin Mathieson says, adding that it does not migrate through the stock, nor transfer under prolonged heat and pressure. It is odorless and colorless and does not change the appearance or basic characteristics of the stock. Circle No. **13.**

● Wrapping Unit Converter

Fabricon Products announces the development of a bread wrapping machine converter for rapid, positive



sealing of polyethylene film. Called Fab-Wrapper, the machine is designed for use with AMF wrapping machines, models 3-22 and 3-121. Instead of stationary hot plates, it has mobile heating elements built into an endless conveyor belt. As wrapped loaves comes off the wrapping machine they are cradled by the heating elements which apply slow, uniform heat to all closure points, Fabricon says. Loaves re-

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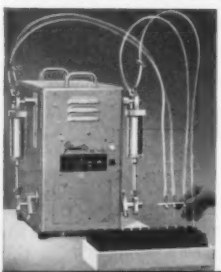

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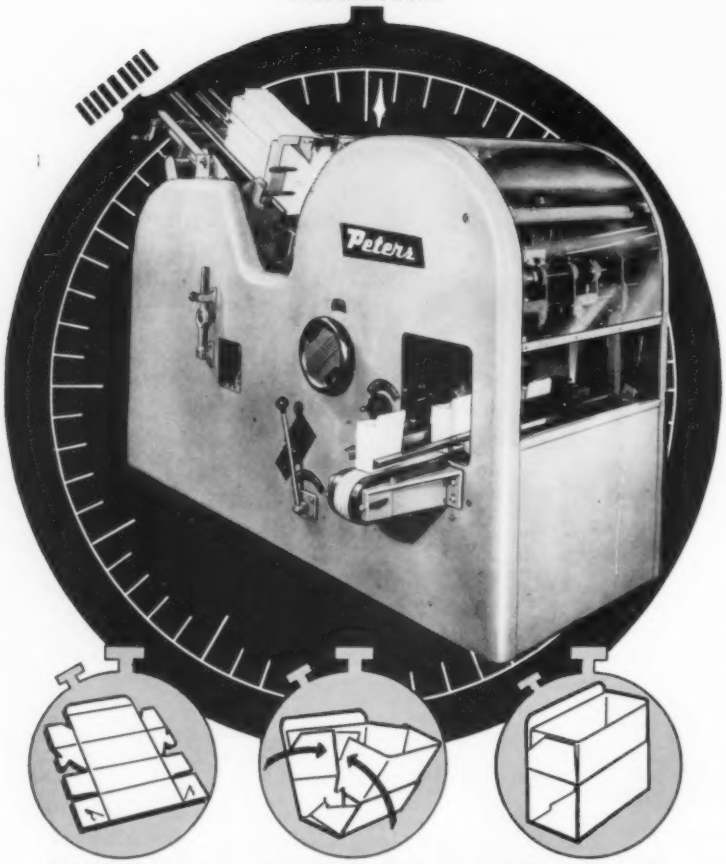

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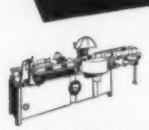
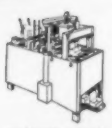

carton folding and closing machines


moderate-speed . . . and high-speed carton and tray forming machines

cellophane sheeting and stacking machines

main pressed against the elements from 7 to 9½ sec. Use of mobile heating elements avoids the application of extremely high temperatures at rapid sequences which normally cause burn holes or imperfect closures, according to the manufacturer. Circle No. **14.**

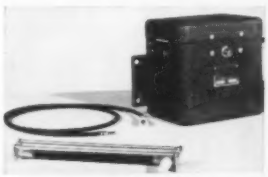
● "Polymorphous" Polyethylene

Spencer Chemical Co., through the development of a new polyethylene resin, has introduced a new product

which it describes as "polymorphous" polyethylene. The film has exceptional clarity and surface gloss because of its low degree of crystallinity and small crystal size. It also has improved resistance to puncture and breakage from impact, as well as absence of straight-line tear. The film will be marketed as the 5300 Series and has a resin density of 0.920. Circle No. **15.**

● Static Eliminator Bars

The Takk Corp. has a new line of "compact" static eliminator bars. Furnished with either one or two



rows of emitting points, the bars are small and easily installed on all types of machines, Takk says. The Model 100-2 has two rows of emitting points set at an angle, doubling the amount of electrical charges from a single bar and creating an ionized field 5 in. wide. The bar also can be supplied with the emitting points diametrically opposed, scanning up to 3 in. in each direction and eliminating static from two webs of material with one bar. Circle No. **16.**

● Glue Applicator Unit

Portland (Conn.) Div. of Emhart Manufacturing Co. has developed a forced-feed system of glue application, named Glu-Line, which uses valve-controlled applicators to apply the glue in stripes or ribbons rather than in a solid band. It replaces glue pots, rollers, and cams—and their driving mechanism, according to Emhart. Glue is fed from a reservoir under air pressure (7.5 to 10 lb./sq. in.) to the applicators, which are actuated by the leading edges of the outer flaps of the case. The skip-gap mechanism lifts the applicator clos-

ing the check valve that controls glue flow. At the end of the gap, an air cylinder returns the applicator to its contact position and glue is applied to the trailing edge of the flap. The amount of glue used can be controlled and changed by adjusting the air, Emhart says. Circle No. **17.**

● Small Parts Bagger

Tele-Sonic Packaging Corp. has developed a new semi-automatic small parts bagger designed to be operated

by handicapped and blind workers. This machine permits bagging in small polyethylene, paper, foil or kraft bags and may be operated with one hand. In operation, the machine gravity feeds pre-measured parts into an open polyethylene bag when the worker raises the pivot-mounted funnel. Fingers at the bottom of the special parts-holding funnel automatically enter the open top bag, directing the contents into the package and preventing spillage. The filled bag is then removed from the magazine for closure. A jet of air from the bagger's internal blower automatically blows open each top bag for rapid product filling. A spring mechanism automatically feeds bags in the magazine forward for filling. The machine enables a sightless operator to determine the accuracy of each fill by sound, according to the manufacturer. Circle No. **18.**

● Unscrambling Device

Island Equipment Corp. announces a new attachment to unscramble straight-sided odd-shaped containers

on its Styl-O-Matic rotary unscrambling tables. The floating wheel attachment rotates opposite to the disc rotation, to kick back one side, enabling the container to discharge onto the take-away conveyor in a lengthwise position, according to Is-

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land. This attachment is available for units now operating. Circle No. **19.**

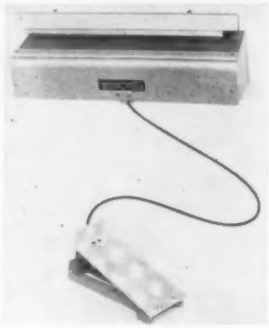
● Metal Edger

Faustel Inc. has developed a metal tear edging machine used for supplying a metal tear edge or strip to

cartons which dispense products such as foil or waxed paper. The machine allows the application of the tear strip to either the edge or one panel back of a carton blank. Having a production speed of 150 cartons/min. when used with Faustel dies, the machine accomplishes carton changeover within 15 min., Faustel notes. Die changes are made in less than 30 min. using a detachable roll feeder. This new edger is available in two sizes — Series C which handles all size carton blanks from 7 to 24 in. and Series D which accommodates blanks from 8 to 30 in. Circle No. **20.**

● Impulse Heat Sealer

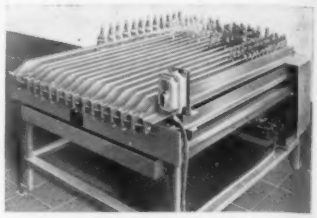
Plastic Welding Corp. announces a new thermal impulse sealing unit which utilizes a rapid heating and



cooling action by pulsing a thin ribbon of high temperature alloy with a high current for a short time interval, the maker says. After the heating current is cut off, the low thermal capacity of the alloy ribbon results in reversal of heat flow, and a resultant cooling action. Though designed primarily for polythylene sealing, the units will also seal such films as saran, vinyl. Circle No. **21.**

● Bottle Sorting Table

The Lodge & Shipley Co. has developed an adjustable, push button controlled sorting table with a self-



contained, self-powered conveyor which delivers bottles to stop and holds them until case quantity is accumulated. Two men and the table replace three or four men formerly required on the job, Lodge & Shipley says. Circle No. **22.**

● Labeling Adhesive

Rubba, Inc. has developed a new labeling adhesive, Rubba-Peel, which eliminates the need for pressure-sensitive labels on polyethylene, polystyrene, metal and other surfaces. Removable labels can be adhered instantaneously with it without the need for removing a release paper prior to application, Rubba says. It is non-inflammable and can be applied by brush or labeling machines. When desired, labels can be peeled easily from glass, plastics, metals, and other materials without leaving any residue. Available in quantities from 1 to 55 gal. Circle No. **23.**

● Imprinting Unit

The Cozzone Marking Co., Inc. announces development of a new fully automatic Micro Coder, engineered to be fitted to any conveyor, carton sealer, packaging or processing equipment. Friction driven, the unit may be used for printing or coding the top, bottom, or sides of a variety of package sizes, and materials, Cozzone says. Consisting basically of three rollers—a felt ink roller, the rubber transfer roller, and a type roller—the unit also has two micrometer scale dials, one for adjusting transfer to type roll; the other, transfer to ink roll. Circle No. **24.**

● Polyethylene Resin

U.S. Industrial Chemicals Co. has available a new polyethylene coating resin—Petrothene 205-15. It has a density of 0.924 and melt index of 3.0. When coated under optimum conditions, it develops maximum polyethylene to substrate bond strength with recommended temperatures in excess of 575°F., according to the producer. Its coating characteristics extend to non-porous substrates such as cellophane and foil as well as porous substrates, U.S.I. says. Coatings as thin as 0.0005 in. can be applied easily, neck-in is reduced to a minimum, and polymer build-up at the die has been virtually eliminated, the producer says. Circle No. **25.** *(End)*

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Paper Bag Applications

Union Bag-Camp Paper Corp.'s Commercial Packaging Dept. manufactures custom-made paper bags for a wide variety of industrial uses. A current thought-provoking brochure illustrates some interesting applications for which these bags have been used. Some such uses include ice cream, machine parts, chemicals, ice, plastic curtains, etc. Circle No. **101.**

Adhesive Handling

National Starch & Chemical Corp., adhesives div., has a booklet, "How to prepare and use glues, pastes and gums." It tells how to store and care for glue, how to prepare equipment, how to thin prepared glues and pastes, and reviews six different general types of adhesives. Circle No. **102.**

Protective Paper Samples

Mosinee Paper Mills is offering a data file containing samples and test data on papers such as laminating and coating papers suitable for end uses as release papers or greaseproof barriers, moisture-resistant papers, flame-resistant papers, Scrimtex, mold-resistant paper, and chemically inert paper for use in contact with metal. Circle No. **103.**

Packaging Adhesives

Arabol Manufacturing Co. has a booklet entitled, "How to buy adhesives for better adhesion," which offers 23 yardsticks for selecting the right adhesives for a particular application. Some factors to be considered: material being used; length of time adhesive must "stick"; conditions such as dry heat, dry cold, moisture with which product may come in contact; how adhesive is to be applied. Circle No. **104.**

Protective Packaging

Jiffy Manufacturing Co. offers a specification sheet that enumerates the various grades of Kushion-Kraft available in sheets or rolls. Designed to provide surface protection and cushioning against shock, this material consists of plies of processed and corrugated paper in either kraft or tissue, or a combination of both. A specification table lists various weights in four different grades of this material. Circle No. **105.**

Corrugated Box Tape Sealer

General Corrugated Machinery Co., Inc. offers a data sheet giving the advantages of its tape sealer. This machine can be added to many present flap-gluing lines and is adapted for dust-sealing, pilfer-proofing or for top-and-bottom plus end-panel taping. This unit handles plain or reinforced tape. Circle No. **106.**

Tenite Polyethylene

Eastman Chemical Products, Inc. offers a 36-page book explaining various uses for Tenite polyethylene resins. Separate sections are devoted to each of the six basic uses of polyethylene: molding, pipe, film, coatings, blowing, and wire and cable covering. A detailed table of specifications gives properties of Tenite polyethylene. Circle No. **107.**

Collapsible Tube Reference

Wheeling Stamping Co. has a 6-page reference for selecting and specifying collapsible tubes, plastic closures, ad specialties, and custom molded tips and caps. Brochure includes illustrations and stocksize table for general purpose closures, collapsible tube caps, snap-on sifter and liquid dispensing fitments, and stock specialty items such as two-piece dispenser caps, polyethylene eye cups, polyethylene applicators, and triple-thread caps for dentifrice cans. Circle No. **108.**

Polyvinyl Squeeze Tubes

Thatcher Glass Manufacturing Co., Inc., plastic container div., offers a folder on its clear polyvinyl "squeeze-to-use" tubes. Available in sizes from ¼ to 10 oz., tubes are suitable for packaging paint pigment, shampoo, shoe polish, oil products, and many others. Circle No. **109.**

VPI Paper Calculator

Ludlow Papers, Inc., has a booklet that presents a chart for simplified calculation of VPI paper requirements necessary to protect a given area. VPI papers are coated with a volatile chemical which protects ferrous metal products against rust. The booklet also includes four fundamental rules for properly handling this material. Circle **110.**

Cellulose Wadding

Cel-Fibe Div., Personal Products Corp., offers an 8-page illustrated brochure on its cellulose wadding material. Regular types of Cel-Fibe wadding include bleached, unbleached, facial-tissue quality, moisture-absorbent, moisture-resistant, wet-strength. Applications in handling, shipping, storing, converting and manufacturing are shown. Circle No. **111.**

Heavy Duty Checkweigher

Toledo Scale, division of Toledo Scale Corp., offers an illustrated 4-page folder on its Model 9460 high-speed automatic checkweigher. Featuring 100 per cent in-line checkweighing speeds up to 40/min., it handles bags, boxes, packages, slabs, and other items. Weight range is 50 to 200 lb.; zone widths vary from 2 to 8 oz. with accuracy of (±) 1/3 oz. Optional accessories include automatic pilot lights and numerical counters. Circle No. **112.**

Automatic Cartoners

R. A. Jones & Co., Inc. offers an 8-page brochure on two models of its "CMV" automatic cartoning machine. These units take a flat carton from a magazine, open it, tuck bottom flaps, convey open carton past manual loading stations, tuck top flaps, and deliver the loaded carton. Cartons handled range from ½ x ¾ x 2½ to 4¼ x 4¼ x 9 in. Circle No. **113.**

Facts About Pliofilm

The Goodyear Tire & Rubber Co., packaging films dept., offers an illustrated brochure giving a non-technical description of Pliofilm; it is entitled "Facts you should know about Pliofilm." It discusses methods of ordering, handling, printing, and so on. Yield and physical data charts are included as well as an end-use chart which lists suggestions on specifying the proper grade and weight Pliofilm for a specific packaging application. Circle No. **114.**

Seamless Metal Cans

George D. Ellis & Sons, Inc. offers Bulletin No. 116 covering details of its seamless metal cans. This bulletin illustrates the various cans, and includes tabulations of their fluid ounce capacities, diameters, body heights, packing per carton, and weight per gross. Circle No. **115.**

Pressure Sensitive Labeler

Avery Adhesive Label Co. has available a specification sheet on its automatic pressure sensitive labeler. Labels are fed from a roll and the machine applies them into a registered position on flat, rounded, or concave surfaces. Standard machine handles labels from ¼ to 2½ in. wide at speeds of 40 to 300/min. Machine may be modified to handle labels up to 6 in. wide. Circle No. **116.**

Pharmaceutical Sample Mailers

Metal Edge Industries has released a brochure of specific interest to the pharmaceutical industry. It outlines the advantages that metal edge boxes offer in pharmaceutical detailing and gives a thorough description of how this method of sampling can effect substantial savings. Circle No. **117.**

Vacuum/Gas Pouch Packaging

Standard Packaging Corp., Flex-Vac Div., offers a 4-page bulletin on the Model 6-12 vacuum or gas pouch packaging machine. Fully automatic, this unit handles luncheon meats, ham, cheese, dried beef, frozen foods, etc., at speeds up to 60/min. Circle No. **118.**

Label Marker

Soabar Co. has a 4-page illustrated folder describing its Model 22 W self-stop

wraps with or without boards or stiffeners and can be supplied with code daters, label imprinters, strip opening attachments, and so on. Circle No. **134.**

Plastic Containers

Celluplastic Corp. has a brochure illustrating its range of stock plastic vials and jars. The line includes rigid polystyrene vials from ⅜ to 2 in. in diameter, with lengths up to 6 in. Extruded flexible acetate and butyrate vials are available in diameters from ½ to 1⅜ in., in almost any desired length. Also described is a line of squat jars in sizes up to 16 oz. The vials come in crystal clear plastic, as well as a variety of colors. Multicolor printing of label or trademark is available. Circle No. **135.**

Hermetically Sealed Overwraps

Aluminum Co. of America has published a folder describing the Pacon Process, which solves the need for adhesive on the foil side of a foil-paper lamination for overwrapping. It permits all metal-to-metal areas to be sealed as well as the necessary metal-to-paper areas on the long side-seam and at the end-folds of the package. The resultant seals provide a barrier to water vapor transmission, gas transmission, infestation, etc. A description of the necessary machinery and an outline of the technique of application is concisely presented. Circle No. **136.**

Polyethylene-Blend Coatings

Semet-Solvay Petrochemical Div., Allied Chemical Corp., has available Bulletin P/S 234, listing advantages of A-C polyethylene, an inert, low-molecular weight polymer, which can readily be blended with waxes, polymers, and resins in hot-melt or water emulsifiable grades. When added to wax coating, it improves gloss, reduces scuffing, and imparts a high blocking point, Semet-Solvay says. Checklist of product applications is included. Circle No. **137.**

Carton Sealing Tape

Shuford Mills, Inc. has a data sheet listing the physical characteristics and applications for its Shurtape RP-25. A heavy-duty, self-sticking carton sealing tape that meets shipment specifications, it offers resistance to water and abrasion, solvents and oil. Circle No. **138.**

Propellant Blending

Union Carbide Chemicals Co. has available a technical article analyzing five methods for blending aerosol propellants. The five blending systems discussed use weigh tank, proportioning pumps, the displacement meter, or radiation equipment, or entail continuous proportioning. Article is illustrated with tables, a photograph, and schematic drawing. Circle No. **139.**

Plastic Vials

Lermer Plastics, Inc. has an illustrated data sheet listing various sizes of its stock line of plastic transparent vials. Available in minimum quantities of 1,000, types include threaded vials with metal screw caps, shoulder vials with polyethylene slip-on caps, or shell vials with polyethylene plug closures. Sizes range from ½ x 2 to 1 x 4 in. Circle No. **140.**

Impact Recorders

The Impact-O-Graph Corp. has a 4-page bulletin that describes various models of its impact, acceleration, and gravity recorders. These instruments are small in size, and lightweight. They record data permanently on a special wax-coated recording tape. Machines are designed to record shocks, impacts, and vibrations from any direction. A list of specifications and other features of various models is included. Circle No. **141.**

Polypropylene Film

AviSun Corp. offers a preliminary technical data bulletin on its polypropylene film. Characteristics and properties of film are listed. Circle No. **142.**

Packaging Machinery

Frazier and Son has a 6-page illustrated brochure on its complete line of packaging machinery for dry products. Photographs and descriptions of each unit are included—volumetric bench, inline and rotary fillers, net weighers and elevator-feed conveyors. Circle No. **143.**

Band-Type Heat Sealer

Ralph Chaffee & Co. has an illustrated brochure describing its Rotor-Sealer. Used in heat sealing thermoplastic materials through a heated metal band, this machine is available in three models. It features forced water cooling, a thermostat range to 600°F., and operates at speeds up to 315 in./min. Sealing widths available are ⅛, ½ and ¾ in. Circle No. **144.**

Short Case Sealers

A-B-C Packaging Machine Corp. has a 4-page brochure on its Model XSA, a short, compact corrugated case sealer. Sealer is adjustable to range of box sizes and offers optional features, such as strip gluing, case counter, serial numbering head, and so on. Circle No. **145.**

Heat Seal Wrappers

Scandia Packaging Machinery Co. offers a data sheet on its Model SUS wrapping machines. Using roll-fed cellophane, waxed paper, and so on, this equipment is available in two sizes that handle packages ⅜ to 3¾ in. high, 2 to 14 in. wide, and 2 to 10 in. long. Speeds range up to 60 packages/min. Circle No. **146.**

Canning Adhesives

Swift & Co. offers a leaflet "Canning Adhesives," that describes and lists applications of 25 different types of adhesives, including hot pick up gums, lap end label pastes, metal and bottle labeling adhesives, case sealing and palletizing adhesives. Circle No. **147.**

Band Heat Sealer

Doughboy Industries has a 4-page brochure on its continuous band sealer with code dater for sealing bags of polyethylene, pliofilm, saran, cellophane and laminated materials. Code dater can also punch bag tops for rack display. Circle No. **148.**

Shockless Static Eliminator

The Portland Co. has available literature describing its Statomatic, a new, completely shockless addition to the Chapman static elminator line. The unit removes static electricity from paper, film, cloth or other materials where static interferes by disrupting normal operations. Paper, polyethylene, mylar, cellophane and other static susceptible materials illustrate the effects of this unit. Circle No. **149.**

Check Weigher

Bartelt Engineering has a brochure on the Olofsson checkweigher which runs up to 70 charges/min., accurate to plus or minus 1/20 oz. The machine handles full flow and semi-flow products such as macaroni or hardware. Machine weighs product before product goes into package, thus saving both package material and product, and can handle ¼ oz. to 20 oz. fills. Circle No. **150.**

Cellulose Bands

E. I. duPont de Nemours & Co., Inc. has a booklet of questions and answers concerning its Cel-O-Seal cellulose bands—cost, application, and point-of-sale merchandising opportunities offered. Circle No. **151.**

Scale-Free Metal Drums

United States Steel Products Div., U.S.S. Co., explains in a 4-page folder how and why they manufacture completely scale-free and rust-inhibited drums. The folder illustrates the difference between its drums and other painted drums. Circle No. **152.**

Blister Packaging Machines

Tronomatic Machine Manufacturing Corp. has available a 4-page folder illustrating three models, including specifications, of its blister packaging machines. Machines for small volume and an automated model are described. Circle No. **153.**

Poultry Products

Riegel Paper Corp. has a 4-page folder discussing the Poultry Products Inspection Act and presenting comments concerning the effect on paper and poultry of this Act. The wrapping, handling and identification of poultry products are viewed. Circle No. **154.**

Corrugated Case Sealer

J. L. Ferguson's illustrated brochure 10037 describes its Model D case gluer with belt compression sealer. Seals both top and bottom flaps or top or bottom only if required. Automatically applies a wide variety of glue patterns, is rapidly and easily adjustable to any case size. Circle No. **155.**

Plastic Packaging Suppliers

Koppers Co., Inc. has prepared a 36-page directory of plastic packaging suppliers to provide assistance in the selection of sources for plastics packages. Both custom and proprietary plastics packaging molders and extruders in the U.S. are listed. A description of the type of service offered by each company listed is included. Circle No. **156.**

Fluff Tester

Testing Machines, Inc. has available a 3-page brochure describing its P.A.T.R.A. fluff tester developed after it was seen that a large quantity of fluff was removed from paper when the paper was passed through the printing machine in contact with a dry blanket. This principle has been used in construction of tester. Circle No. **157.**

Boil-In-Bag Packaging

Reynolds Metals Co. has a 22-page booklet on the boil-in-bag packaging and cookery movement. Technical areas of basic research and machinery development are presented, as well as marketing information. Circle No. **158.**

Obliterating Fluid

Reynolds Ink, Inc. has a bulletin en-

titled Stencil-Kover which describes its new non-clogging, quick-drying, water proof and very opaque tan-colored material to cover over and block out old stenciling, penciled or painted markings on cartons, boxes and crates. In an aerosol container, the material permits quick re-stenciling and re-use of original containers. Circle No. **159.**

Vibratory Feeder

Syntron Co. has available a 32-page catalog describing its vibratory feeders. Complete descriptions, data, specifications, and illustrations are included for its line of small, heavy, and extra-heavy-duty standard electromagnetically vibrated feeders. Circle No. **160.**

Packaging Knives

Coes Knife Co. offers an illustrated folder outlining its line of packaging and industrial use knives. Discussed are various shapes and composition. Circle No. **161.**

Can Packer

Crompton & Knowles Packaging Corp. describes and gives specifications for its CKSK can packer in an illustrated bulletin. Mechanical drawings and features are given of this machine with a production rate of 25 cases/min. and which can handle case sizes from 202-610 liameter and 208-600 (double tier) and 900 maximum (single tier) in height. Circle No. **162.**

Cartoner

U. S. Automatic Box Machinery Co., Inc. has a bulletin on its C-24 cartoner which operates at a speed of 60 C.P.M. in the ¼-½ lb. range. Carton sizes of 6 x 2 x ¾ in. (minimum) to 7 x 3½ x 1 in. (maximum) can be handled on this one-man machine. Circle No. **163.**

Case Packer

W. F. & John Barnes Co. has a 4-page brochure describing its automatic case packer for bottled goods. Bottles are fed through laned conveyor and pattern collecting station, raised into inverted case. Filled case is then automatically turned over and flaps are glued and closed. Circle No. **164.**

Time/Motion Study

Atlantic Gummed Paper Corp. has available a time and motion study, a condensed report made by Container Laboratories, comparing the relative efficiency of four different methods of closing corrugated containers—"padlock" reinforced tape, gummed tape, hand stapling, gluing. Circle No. **165.**

Automatic Pallet Loader

Lamson Corp. offers a 16-page brochure on its automatic pallet loader for corrugated containers. It describes advantages of pallet loading and presents information about operation of its machines. Single or multiple (3 or 4) feed lines handling a wide variety of container and pallet sizes are discussed. Circle No. **166.**

Multiwall Bags

West Virginia Pulp & Paper Co., through a folder on its Wonderwall bags, claims bag breakage can be reduced. It cites National Gypsum's experience, with aid of photographs and commentary. Circle No. **167.**

Filler/Sealer

Carbert Manufacturing Co., Inc. has available bulletin No. 16, describing with photos, drawings, and a list of special features, its bank-seal, Model 60, automatic plastic tube filler and sealer. Filling up to 120 tubes/min., the machine needs no change of parts for various plastic tube materials. Circle No. **168.**

Marking Machine

Industrial Marking Equipment Co., Inc. has a catalog covering its line of marking, dating, and coding machines. This illustrated catalog gives technical data on the Whippet Marker, No. 7 Autoprinter, Rainbow coder, and other standard units. It outlines base lock types and logos, as well as custom-designed marking machines for special application. Circle No. **169.**

Label Design

Allen Hollander Co. has information available on its Design-It-Yourself Label Kit, containing detailed step-by-step instructions for designing labels with a wide choice of standard borders, shapes, type styles, and color combinations. Different border designs (41 total) are illustrated. Examples of good label design and a checklist are included. Circle No. **170.**

Plastic Screw-Cap

The Poly-Seal Corp. offers an illustrated folder describing the advantages of its Poly-Seal closure, a plastic screw-cap with a polyethylene cone liner. It eliminates leakage, evaporation, contamination, binding, and back-off, Poly-Seal says. Adapted to high-speed capping machines, the machine is designed to overcome the pumping action of liquids due to atmospheric pressure or temperature changes. Circle No. **171.**

Polyethylene Containers

Delaware Barrel and Drum Co. has a 4-page brochure describing its models of one-piece molded polyethylene containers with wooden wirebound drum overpacks. Drums having capacities of 5, 15, 30, and 55 gal. are shown and described. Circle No. **172.**

Test Equipment

American Instrument Co., Inc. has available a catalog describing its environmental test equipment that duplicates global climatic conditions, baths, ovens, steam-humidity chambers, and incubators—all of which control temperature and humidity in the laboratory. Designated as No. 560, it includes 41 pages of illustrations, descriptions, and a temperature conversion chart from °C. to °F., or °F. to °C. Circle No. **173.**

Unscrambling Table

Climax Products, Div. of The Lodge & Shipley Co. offers information on its unscrambling table and Flo-Control. Advantages and special features are presented, with illustrations of its operation. Circle No. **174.**

Filling Equipment

Arthur Colton Co. has an 8-page, illustrated catalog (AC-60) describing Colton, Colton-Hope, and Colton-Alpha filling equipment for the pharmaceutical, chemical, cosmetic, paint, plastics, and food industries. Automatic metal and plastic tube fillers, closers and crimpers for pastes, creams, and liquids, volumetric-fill types, straight-line models, can coders, and other equipment are described. Circle No. **175.**

Piston Filler

Girdler Process Equipment Div., Chemetron Corp. offers data on its Votator piston filler. Claiming higher speed and accuracy with reduced spillage, the filler is available with 6 through 36 stations. Circle No. **176.**

Design Guide

Monsanto Chemical Co. has a 24-page design guide for packages made from paper and paperboard sized with Mercize brand sizing; packages have a high resistance to liquid penetration. Among illustrated suggested uses are serve-in-package cartons and seedling pots for plants. Circle No. **177.**

Packaging Abstracts

PACKAGE ENGINEERING magazine is offering sample copies of "Packaging Abstracts," a monthly service that abstracts articles about packaging from some 200 magazines from all over the world. Each issue is divided into 18 sections with subjects of raw materials, adhesives, coating treatments, shipping containers, etc. Circle No. **178.**

Ice Cream Filler

Anderson Bros. has a data sheet on its automatic ice cream filler for 4- to 6-oz. packages. Fills Philadelphia style linerless cartons at 80/min. All parts are stainless steel. Circle No. **179.**

Container Labeler

Amaco, Inc. has a folder on the Newman line of labelers. Semi-automatic bench model handles all shapes of labels and bottles, and objects as small as a lipstick top to as large as a wine bottle. Cylindrical objects only are handled. Circle No. **180.**

Skin Packaging

Skin-Pack, Inc. offers a brochure describing its skin packaging machinery. Dimensions and specifications as well as illustrations, charts, and descriptions are included. Circle No. **181.**

Electric Temperature Controls

Fenwal, Inc. offers a 4-page bulletin describing and giving specifications for many of its differential expansion Thermoswitch controls which cover a range of temperatures. Standard size, midget, miniature, and snap-on switches are included; and electronic, mechanical and thermistor indicating controllers are discussed. Circle No. **182.**

Steel Strapping and Accessories

Stanley Steel Strapping, Div. of Stanley Works, has a 16-page illustrated catalog giving specifications for its entire line of steel strapping, strapping seals, strapping tools, corner protectors, and accessories. Circle No. **183.**

Plastics Packaging

J-E Plastics Packaging Co., Inc., has a new work book, called "Catalog of Ideas." The book not only includes a catalog of products available, but actually offers a short "seminar" on semi-rigid plastic packaging. It provides complete manufacturing procedures, printing information, and full details to help a designer or purchasing agent obtain all necessary specifications to develop style, size, or other pertinent data on developing a package for a specific product. Circle No. **184.**

(End)

Testing packages with model foods

(Continued from Page 45)

III) of high-density polyethylene (Visotherm) were decreased by irradiation. Irradiation produced an amber discoloration in Pliofilm, saran, and polyvinyl chloride-acetate films. Irradiation caused minute cracks to form in Kel-F.

All of the films released odors into the water solutions, undoubtedly as a result of fragmentation. The weakest off-tastes appeared in the water irradiated in the Kel-F and polyvinyl chloride-acetate bags.

TABLE VII

Weight Loss Of Bags Containing 5 Per Cent Acetic Acid Solution Stored Two Months At 15 Per Cent R. H., 100° F.

	Radiation Dose (reps)				
	0	1	3	6	Avg.
Bag Material	Weight Loss (%)				
Polyethylene-Mylar	14.8	11.2	17.6	11.0	13.7
Polyethylene-cellophane	—	7.6	6.9	—	7.3

The following are the results obtained with each model food. Unless otherwise stated, the measured physical properties of the film were not significantly affected by any combination of the food, irradiation, or storage at 100° F., 90 per cent R.H. (Storage at 15 per cent R.H. was found to be less deleterious.)

Sodium Chloride

Brine, 5 per cent sodium chloride in water, was relatively easy to package satisfactorily. Films made of polyethylene-Mylar polyester, polyethylene-cellophane, and polyethylene-aluminum-Mylar-polyethylene held the brine successfully; their physical properties were only slightly affected by the brine or the radiation. Although we did not test Scotchpak with brine, it undoubtedly would have been successful also.

All of the unlaminated polyethylene bags leaked, some at the seals and some in the unsealed portions of the films. Polyethylene-saran bags delaminated; Kel-F bags cracked and leaked; and polyvinyl chloride-acetate bags leaked.

Inspection of the data of Tables IV and V suggested that the peel-seal strength of polyethylene-Mylar and the elongation (at break, machine direction) of polyethylene-cellophane were decreased by irradiation. However, statistical evaluation showed these apparent trends to be insignificant. There was a slight, but significant, decrease in the peel-seal strength of polyethylene-Mylar due to contact with the solution, as shown in Table IV. The original polyethylene-Mylar package had a peel-seal strength of 6.7 lb./in. and the average of all of the samples after contact with sodium chloride was 5.0 lb./in.

Lactic Acid

Lactic acid solution, 5 per cent in water, proved to be one of the more difficult liquids to package successfully. Ultimately, only two films were satisfactory. Scotchpak was not affected adversely. The combination polyethylene-aluminum-Mylar-polyethylene received limited evaluation for tensile strength, elongation, and peel-seal strength; these properties were unaffected. No trouble with leakage was encountered with these two films.

Other films were not evaluated completely because the bags failed by leaking during storage. The extensive leakage encountered with lactic acid was attributed to the known tendency of lactic acid to produce stress-cracking at seals and creases in the bags. Other than leakage, the measured physical properties of the films were not affected by the lactic acid.

Acetic Acid

Acetic acid, 5 per cent in water, was among the more easily packaged liquids. Only polyethylene-Mylar and polyethylene-cellophane were evaluated with this model food. Polyethylene-Mylar suffered a loss in peel-seal strength (e. g., from 6.8 to 4.0 lb./in. after irradiation at 6 megareps and storage for 2 mo. at 100° F., 90 per cent R.H.). This loss was independent of irradiation and evidently was caused by the acetic acid (Table VI).

The polyethylene-Mylar bags also had a relatively high weight loss that averaged 13.7 per cent after storage at 15 per cent R.H., 100° F. for 2 mo., and again radiation was not a factor. This loss may be

(Continued on Page 124)

TABLE VIII

Elongation At Break Of Scotchpak Used With Cottonseed Oil

Time Stored* (wk.)	Relative Humidity (%)	Radiation Dose (reps) 0	1	3	6	Avg.
		Elongation † (%)				
0		125	122	126	129	125
1	15	126	97	119	122	116
1	90	98	106	119	112	108
9	15	94	106	118	109	106
9	90	108	124	126	112	117
Average		110	111	122	117	

*Recorded time for storage was in addition to shipping time which varied from 1 to 2 wk. The conditions of storage were 100° F. at the relative humidity noted.
†Original bags: 150%

TABLE IX

WVTR Of Scotchpak Used With Cottonseed Oil

Time Stored* (wk.)	Relative Humidity (%)	Radiation Dose (reps) 0	1	3	6	Avg.
		WVTR † (gm./100 sq. in./24 hr.)				
0		0.04	0.08	0.06	0.06	0.06
1	15	0.06	0.11	0.08	0.04	0.07
1	90	0.04	0.04	0.06	0.09	0.06
9	15	0.08	0.05	0.05	0.04	0.06
9	90	0.08	0.07	0.05	0.07	0.07
Average		0.06	0.07	0.06	0.06	

*Recorded time for storage was in addition to shipping time which varied from 1 to 2 wk. The conditions of storage were 100° F. at the relative humidity noted.
†Original bags: 0.15 gm./100 sq. in./24 hr.

Note No. 15: Triple-wall corrugated boxes - Part II

By K. Q. Kellicutt and C. C. Peters,
Engineers, Forest Products Laboratory, Forest Service
U. S. Department of Agriculture, Madison, Wisconsin

Introduction. The triple-wall boxes discussed in Note No. 14* were made from board having C-, A-, and B-flute corrugations with the A-flute in the center. The material was shown to be extremely rigid in compression and very resistive to the rapidly applied stresses encountered in a drop test. Because of the test performance attained with this material, it appeared to be excellent for containers that required a higher degree of compressive strength than could be attained with double-wall board. In addition, it would not be appreciably heavier than double-wall.

In further study of triple-wall board, it was shown by calculations that the buckling resistance of triple-wall as a column could be changed considerably by rearranging the C-, A-, and B-flute combination and changing the positions of the 90- and 42-lb. liners in the structure. Therefore, it appeared logical that some additional stiffness could be attained by making minor changes in the built-up board.

Moment Of Inertia Of Triple-Wall Corrugated Board

The arrangement of components is especially important in multi-wall structural material (Note No. 7†), such as double-wall and triple-wall board. In either of these two materials, the stiffest board will result by placing the heaviest, thickest liners of the structure on the outside surfaces.

In so doing, the greatest possible amount of material is kept as far as possible from the neutral axis of the structure. This can best be illustrated by comparing the calculated moment of inertia of four hypothetical boards made from two combinations of A-, B-, and C-flute corrugated sections and two arrangements of light and heavy liners in the built-up board. The calculated values are shown in Table I.

In this table, it may be seen that the highest moment of inertia, for the four combinations shown, is obtained by placing the A-flute section in the middle of the board and using the 90-lb. liners on the outside. Actually, the moment of inertia for the best of the four boards is over 1.5 times higher than that for the worst board, which has the B-flute section in the middle and the 42-lb. liners on the outside.

This becomes an important consideration in view of the fact that there would be exactly the same amount of material in each of the four boards. Because the calculations demonstrated the importance of flute and liner arrangement in attaining the greatest possible bending stiffness, it was decided to run a series of tests in order to show the significance of the principle more conclusively.

Column Tests

To disrupt a triple-wall box manufacturer's production line for the sake of obtaining sample lots of a variety of combinations of triple-wall was not considered feasible; so, the next best procedure was used. This system consisted of obtaining quantities of commercially made A- and C-flute single-faced board having either a 90- or 42-lb. liner. In addition, a quantity of matching 90- and 42-lb. liner was obtained.

With these materials, six different combinations of triple-wall were fabricated by hand gluing the appropriate combinations of single-faced board and liners together. From these built-up boards, columns were cut and tested. Through experimentation, it was found that the appropriate size of a specimen that would fail mainly by buckling needed to be 18 in. in length and 4 in. in width, providing a 16-in. span between the column clamps.

Prior to testing the columns, which was done in a controlled atmosphere of 73°F. and 50 per cent R.H., the moment of inertia was calculated for each of the six boards.

Actual column test results revealed exceptionally good agree-

* Kellicutt, K. Q., "Note No. 14: Triple-wall corrugated boxes – Part I." PACKAGE ENGINEERING, **5** (1960), No. 3 (March), p. 122.
† Kellicutt, K. Q. and Peters, C. C., "Note No. 7: Relationship of moment of inertia to stiffness of corrugated board," PACKAGE ENGINEERING, **4** (1959), No. 8 (August), p. 84.

ment between the calculated moment of inertias and the loads attained for the various boards. The greatest column load was obtained for the board having the highest moment of inertia. This board consisted of three A-flute sections and had the 90-lb. liners on the outside with the two 42-lb. liners as intermediates. The moment of inertia for this board was 1.7 times as great, and the actual column load 1.8 times as great, as for a board consisting of two outer A-flute sections with a C-flute center section and having the two 42-lb. liners on the outside with the 90-lb. liners as intermediates.

A more direct comparison of the effect of liner arrangement on the moment of inertia, and in turn on the actual column test load, can be shown by comparing the board with three A-flute sections having heavy outer liners with another board consisting of three A-flute sections, but with the 42-lb. liners on the outside. In this instance, the moment of inertia was found to be about 1.4 times as great with the heavy liners on the outside, and the actual column test load was about 1.5 times as great as it was for the board consisting of three A-flute sections wtih the heavy liners on the inside.

Other comparisons can be made between the calculated moment of inertia values and actual column loads for the handmade samples by examining the values of Table II. In this table, it will be seen that, with the exception of two column loads whose order appears to be reversed, the specific actual column loads coincide with the appropriate moment of inertia. The reversal involves a C-A-A and an A-C-A board, both of which have the heavy liners on the outside. Here it may be seen that the column loads are about the same—141.0 and 146.0 lb.—and the moment of inertia values are not appreciably different. Because of these similarities and because the samples were handmade, and perhaps less uniform than machine-made board, the reversal may be accounted for.

TABLE I

Comparison Of Calculated Moment Of Inertia Of Four Hypothetical Triple-Wall Corrugated Boards

Flute Arrangement Of Board	Moment Of Inertia (in. ^{4}/in.) Liner Arrangements	
	Outside: 90 lb. Intermediate: 42 lb.	Outside: 42 lb. Intermediate: 90 lb.
C-A-B	0.004594	0.003506
C-B-A	0.004176	0.002974

TABLE II

Calculated Moment Of Inertia And Actual Column Test Values For Six Triple-Wall Corrugated Boards

Flute And Liner Arrangement By Weight*	Calculated Moment Of Inertia (in. ^{4}/in.)	Actual Maximum Column Loads (Column 16-in. span, 4 in. wide) (lb.)
A-A-A 90-42-42-90	0.006910	170.0
C-A-A 90-42-42-90	0.006127	141.0
A-C-A 90-42-42-90	0.005920	146.0
A-A-A 42-90-90-42	0.005065	113.0
C-A-A 42-90-90-42	0.004491	98.5
A-C-A 42-90-90-42	0.004018	91.0

*Designates the position of the liners in the order of outside-intermediate-intermediate-outside.

It is significant to notice that the best combination tested, the A-A-A board with heavy outer liners, attained a maximum column load almost twice (170 lb.) that attained by the poorest arrangement (91 lb.), which consisted of an A-C-A flute arrangement and the 90-lb. liners as intermediates. Even more significant is the fact that both boards would be of essentially the same weight, the A-A-A board being only slightly heavier.

An appreciation of the reason for wanting the highest possible moment of inertia for a board may also be gained by appraising the inertias in the light of their influence on the maximum buckling load attained by examining a column formula. Assume the Euler column formula would be applicable for a certain set of conditions in which the load, P, is

$$P = \frac{4\pi^2 EI}{l^2}$$

where 4 is a factor for fixed ends, E the modulus of elasticity for material of the column, l the length of column in inches, and I the moment of inertia.

Here it may be seen that, with two columns of triple-wall corrugated made from the same components, employing the same three kinds of flutes, and differing only in the flute and liner arrangement, the buckling load would vary *directly* as the moment of inertia values varied. For example, if in one instance the moment of inertia was *twice* that of the other, the load would be *twice* that of the column having the smaller moment of inertia.

We do not contend that a box made from the board that attained 170 lb. in the column test would have a compressive strength twice that of a box made from the other board, which had a value of 91 lb. in the column test. Nevertheless, the box would be appreciably better, and it is important to **specify arrangements that will provide the most strength for the least weight.** *(End)*

Testing packages/model foods

(Continued from Page 121)

compared with a loss of 7.3 per cent from the polyethylene-cellophane bags (Table VII). The loss of package contents was not evident by visual examination or by feel—only by weighing.

Methionine

Methionine, an amino acid bearing a thioether group, was packaged as a 4-per cent solution in water. It was more easily held than lactic acid. Only polyethylene-cellophane and polyethylene-Mylar were evaluated with this model food. Both these films were satisfactory in that their physical properties remain unaffected. However, the bags of polyethylene-Mylar leaked to a small extent; so, the utility of this film is questionable.

Sucrose

Sucrose was packaged as a 5-per cent solution in water. Polyethylene-cellophane, polyethylene-Mylar, and Saran Wrap 6D were evaluated with this model food. The Saran Wrap was not evaluated completely because of excessive leakage. The other films performed satisfactorily.

Cottonseed Oil And Cottonseed Oil-Vinegar Emulsion

Cottonseed oil affected the properties of almost all the films evaluated. It was the most difficult of the model foods to package. The combination polyethylene-aluminum-Mylar-polyethylene was the only film not affected. The elongation (Table VIII) and WVTR (Table IX) of Scotchpak were decreased, but otherwise this film behaved satisfactorily. Polyethylene-saran delaminated. The other films leaked excessively.

Scotchpak was the only film evaluated with a cottonseed oil-vinegar emulsion. Physical properties of the film were not affected.

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Product controls packaging

(Continued from Page 53)

mechanical action. Often there is a combination of these. Limitations of space there preclude going into full detail of the combinations and possibilities. The point is that they work together as parts of an integrated system.

Pending further refinement of the system at Lewis-Howe, there is a console equipped with manual controls. These manual controls, handled by the operator at this master console maintain the timing and balance of the units on the line. Next phase of the project will be installation of automatic timing and phasing coordination by a computer to maintain the entire system in a balanced condition. *(End)*

Aerosol revolution

(Continued from Page 62)

and based on the largely public ideas given in this article. Lowered costs will broaden the base of the aerosol industry, making the pressure package more competitive with traditional packaging. Even the most individual and independent personages in the industry today must admit that their prosperity rests as much on the general forward march of the package as upon any personal initiative. By a contribution to lowering production costs generally, we look forward to the continued growth of the aerosol industry and the continued prosperity of the forward-looking organizations that constitute this wonder child of our day.

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(3) Root, M. J. and Maury, N.J., "Gas chromatographic analysis of aerosol products," *Journal Society of Cosmetic Chemists*, (March, 1957). *(End)*

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What we think

QM Food & Container Institute should stay in Chicago

The other night a noted foreign traveler told us of inside talks with key figures of the great international money and banking center in Switzerland—whose transactions affect the value of moneys all over the world. They said that if we don't balance our budget within two years, our dollar will then drop 30 per cent in value. All this places a high premium on governmental economy and on chopping down federal spending wherever we can.

But when brass hats from the Pentagon go trekking over to Capitol Hill telling Congress they can save the taxpayers some money by moving the Quartermaster Food & Container Institute from Chicago to Natick, Massachusetts, (a woods and lakes region near Boston), we become downright suspicious. The incongruity of the military brass in their unlikely role as advocates of economy prompts digging a little deeper.

QM researchers need access to industry

The primary task of the Institute is to develop the latest in packaging and food technology for the military services. In meeting this challenge, the Institute is doing a job of research that merits encouragement. Our field needs to have a group of dedicated researchers reaching well out into left field and blue sky territory to indulge in the forward thinking that leads to packaging progress.

There are compelling reasons why the Institute should stay in Chicago: (1) Easy access to the major research facilities of leading universities, private industry and concentrations of governmental talent—such as the famed Forest Products Laboratory in Madison; (2) it is in a center of concentration of food product and container manufacturers; (3) proximity to the Military Subsistence Supply Agency with whom Institute people have daily telephone and personal contact; (4) nearby Illinois Institute of Technology has offered the QM Institute ideal facilities—with IIT even offering to finance the move at cost.

Those beating the drum for the move to Natick claim only 15 per cent of the Institute's research involves the Chicago area. This figure is too conservative. We think 20 per cent is more like it. Further, another 30 per cent of its research takes place in the Midwest, 20 per cent in the Far West and Pacific Coast area and of the remaining 30 per cent only part of it takes place in the East—because some of it goes on in the South.

But 60 per cent of the research for which the government does not pay a penny takes place in Chicago. Loss of contact with food manufacturers and sources of packaging supply contributing to the work of the Institute would be a loss of incalculable value to the government and to the taxpayers.

We hear that the Massachusetts politicians, worrying about loss of industry there, would like so important a government function transferred to their bailiwick—thus stimulating an orgy of construction and bringing more people and activity into the state.

It appears the Department of Defense wants to close the Chicago Administration Center which houses among other units the Quartermaster Food & Container Institute. This is a laudable move as the center is unsuited to the present usage of the military. But let's not get the economy of closing the center mixed up with the moving of the QM Institute which, incidentally, occupies about 8 per cent of the space in the center. And let's also take a look at the cost of moving 260 people and equipment to Natick and the cost of building suitable facilities there. Balancing that against the proposal of IIT just on a dollars and cents basis the proposed exodus of Natick is indefensible.

Tell Congress to leave Institute in Chicago

Advocates of the move are now guiding their scheme through Congress. We haven't much time to stop the allocation of funds for this move, but we hope the efforts to do so have succeeded by the time this gets into print (it's touch-and-go right now). Just the same the packaging field can take no chances on its progress being impaired. Tell your senators and representatives to leave the Institute in Chicago.

Bruce Hollingren

Editor

New Data on Aluminum Foil Packaging for Frozen Foods

Report No. 25 of a Series by Reynolds Metals Co.

The advantages of aluminum foil packaging in maintaining the temperature of frozen foods have long been recognized. Phases of the subject were presented in two previous reports of this Series. Report No. 9 dealt with packaged ice cream, with and without aluminum foil overwraps, in display freezers. In the vulnerable upper layers, temperatures of the foil-wrapped product averaged 9° less than for the ice cream without foil. Report No. 17 compared speed of freezing and extent of dehydration in variously packaged green peas in an air-circulated freezing compartment at −10°F. Results showed foil-wrapped peas reaching 0°F. in about half the time required for non-foil-wrapped peas—and dehydration, as measured by cavity ice, significantly less.

Added Importance for Foil

Currently, aluminum foil packaging for frozen foods takes on added importance in view of the recommendations of the Association of Food and Drug Officials of the United States to establish a national maximum-temperature code.

It is in the light of this development that the Packaging Research Division of Reynolds Metals Company sought — and here presents — additional data specifically on the moderation of temperature rise in the contents of open display freezers.

Tests Use Frozen Vegetables

The new research compared packages of frozen whole broccoli overwrapped with printed Reyseal (Reynolds foil-wax-tissue heat sealing lamination), and the same packages overwrapped with printed wax paper (33 lbs. per ream coated bright finished paper overwaxed with approximately 14 lbs. of wax per ream). Thermocouple leads were introduced to the center of the test packages, then the packages were stacked in an open display freezer—stacked six high in center front position with other packages at the sides and behind. Thermocouple readings were recorded at the peak of the defrost cycle (once in 24 hours) and after temperature had dropped to equilibrium conditions. The freezer was set to maintain −20°F. As the tables show, the top foil packages averaged 12.4° colder during the freezing cycle and 8.6° colder at the peak of the defrost cycle. For the lower packages in the stacks, the foil packages averaged approximately 2.5° colder during both cycles.

Analyses of the Tables

Variance analyses of the test data show that the average differences in temperatures between foil-wrapped and wax-paper-wrapped packages are highly significant statistically. There is less than 1 chance in 100 of such differences occurring by chance.

Analysis also shows that all or nearly all of the observed differences are attributable particularly to the top packages, which are exposed to the maximum effect of external (radiant) heat sources.

Two-Way Effectiveness

These results tend further to confirm that both the radiant heat reflectivity and the high thermal conductivity of aluminum foil are involved in its effectiveness in moderating temperature rise. Less radiant heat reaches the contents when packages are foil-wrapped. And absorbed heat is more rapidly conducted by foil — to be dissipated in the lower part of the stack by contact with refrigerated air and colder surfaces.

Now More than Ever

The AFDOUS "zero temperature" code proposal re-emphasizes the importance of temperature reduction and therefore the value of aluminum foil protection for frozen foods. The advantages of this protection include both maintenance of product quality through temperature rise moderation and also economies in freezer cabinet operation. For further information, please call your local Reynolds representative. Or write to **Reynolds Metals Company**, Richmond 18, Virginia.

Package Temperatures During Defrost Cycle

Average of five replicate cycle temperatures (°F.)

Foil Overwrap	Advantage For Foil	Wax Paper Overwrap
+16.0	8.6	+24.6
+ 6.4	4.4	+10.8
+ 5.6	4.0	+ 9.6
+ 5.2	0.4	+ 5.6
+ 0.6	1.4	+ 2.0
+ 7.0	2.2	+ 9.2
Average + 6.8	3.5	+10.3

Average difference bottom 5 packages = 2.5° F.

Package Temperatures During Freezing Cycle

Average of four replicate cycle temperatures (°F.)

Foil Overwrap	Advantage For Foil	Wax Paper Overwrap
−12.2	12.4	+ 0.2
−12.2	2.4	− 9.8
−12.8	2.8	−10.0
−10.8	0.8	−10.0
−15.2	3.2	−12.0
−17.2	3.0	−14.5
Average −13.5	4.1	− 9.4

Average difference bottom 5 packages = 2.4° F.

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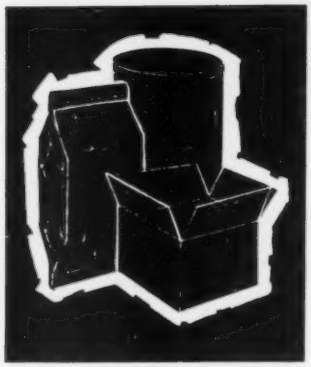

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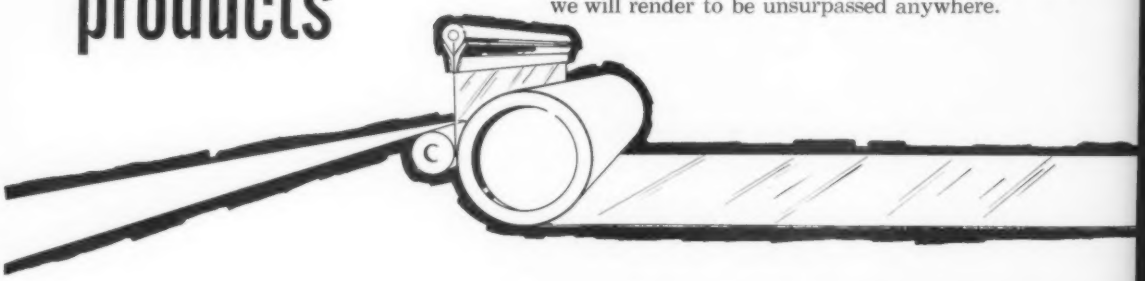

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